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OF THE

MARYLAND

ACADEMY OF SCIENCES

VOL. I

NEW SERIES

1888-1900

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TRANSACTIONS

OF THE

MARYLAND-ACADEMY OF SCIENCES

1888

SKETCH OF THE HISTORY OF THE MARYLAND ACADEMY OF SCIENCES.

The present Maryland Academy of Sciences was organized by Mr. Philip T. Tyson, Rev. John G. Morris, and several other prominent gentlemen of the city of Baltimore, with a view to the cultivation of a scientific spirit in this community, and to enlarge the boundaries of their own knowledge through comparison and discussion with other students of the sciences. A prominent object of the organization was also to acquire wider and more accurate information respecting the natural resources of the State of Maryland.

In May, 1855, several of these gentlemen, who were members of the Maryland Historical Society, formed a "Committee on Natural History," by act of that Society, and met fortnightly in one of its small rooms until the close of the year 1862.

On the 22d of January, 1863, a meeting was held at the house of Mr. Philip T. Tyson, and the present Maryland Academy of Sciences was organized by the adoption of a constitution and the election of Mr. Tyson as its President. The meetings of this organization were thenceforth held every fortnight at the house of some one of the members, until April, 1867, when they were transferred to the building of the University of Maryland, on Mulberry Street, nearly opposite the Cathedral. In 1867 an act of incorporation was asked from the Legislature of Maryland, and this was granted on the 15th of March of the same year.

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By this time, collections of natural history specimens and of books had so accumulated at the rooms of the Academy, that it became necessary to secure space for the accommodation of a museum. In 1868 a large room on the third floor of the Chatard Building, at the southwest corner of Charles and Lexington streets, was rented by the Academy, and there were arranged the first museum and library of the new organization. Through five years of growing encouragement, the members of the Academy, among whom were several of the most prominent physicians, surgeons, and professors of this city, worked to increase the collections of natural history. Piles of specimens, such as bones of whales, skulls of sawfish and porpoises, and fragments of natural objects from all quarters of the earth, filled the tables at every meeting.

The more active members grouped themselves into sections, each of which took charge of one or two subjects to be investigated. At the next following meeting of the Academy a representative of each section gave a report of the more conspicuous or attractive objects referred thereto, and so the interest of the Society was continually kept awake by the fresh material brought to its consideration.

This was the period of accumulation, when the more impulsive and less experienced members were eager to amass an universal museum of vast extent, which should appeal, by its very size and comprehensiveness, to the local pride and patronage of the citizens of Baltimore. It was soon perceived that such an establishment required large endowment and many experienced naturalists to develop and make it useful, such as were far beyond the existing opportunities of the young Society.

Much discussion took place between the members as to the future home of the museum, and it soon became apparent to the citizens of Baltimore that an effort must be made to secure accommodations for the increasing collections, which already overflowed the apartments provided for them in the Chatard Building. Accordingly, in 1873, the Academy secured the lease of a lot of ground on Mulberry Street, having a front of thirty feet by a depth of one hundred and fifty feet, from the University of Maryland and adjoining its large building.

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Subscriptions to a building fund were solicited from many prominent and wealthy citizens of Baltimore, who cordially responded to the call, and these, added to contributions from members of the Academy, raised the amount to about $3000. This was sufficient to pay for the construction of a simple building seventy feet in length by thirty feet in width, which was deemed large enough for a first display of specimens. It was hoped that additional money might be secured thereafter to enlarge this building, or to build another in accordance with future needs.

The building was begun in the autumn of 1874, and was made ready for occupation by the opening of the new year, 1875. On the evening of the 18th of January, 1875, it was formally opened in the presence of about two hundred prominent and interested citizens of Baltimore, who expressed much pleasure at the prospect of having a permanent collection of carefully classified specimens in geology and natural history, ready for the free reference of all who desired to consult them.

By means of a gallery placed around the entire wall, room was made for numerous glazed cases, which accommodated great groups of specimens in many branches of the animal kingdom. On both sides of the hall, large cases with glazed ends and doors held the collections of stuffed beasts and birds, of alcoholic or articulated reptiles and fish, while a case at the one end held the corals and their allies, opposite to which were placed the collection of Indian relics. At the inner end of the hall a vertical case held series of the rocks and fossils representing each of the geological formations of Maryland. In the cases on the gallery were arranged the collections of conchs and shells, the crustacea, and nests of birds and insects and all the varieties of insect architecture, beside the fungi, mosses, minerals, and a great collection of fossils from the western part of this State. The open space in the middle of the room served as a place for the meetings of the Academy and for public lectures.

Soon after removing the museum from the rooms on Charles Street, it was decided to restrict the objects placed on exhibition, in the new building, to such as belonged particularly to

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the State of Maryland. This plan was pursued thereafter, so that by the time of the centennial year, 1876, all available space in the building was occupied by cases almost filled with specimens illustrative of the fauna and flora of this State.

In the spring of this year, the Centennial Commissioners of Maryland appealed to the Academy to aid them in placing a full series of all the principal natural productions of the State on exhibition in the State building at the Centennial grounds in Philadelphia. This aid was freely granted. The Commissioners appropriated $600 to pay for services in securing specimens of marbles, granites, and other building stones of the State, also for alcohol, and jars to hold the fish and creatures belonging to its waters, and for preparing the requisite birds and animals. The appropriation not being sufficient, it was increased to $900, and this sum enabled the officers and Curator of the Academy to fill out typical series of Maryland natural history specimens, and to classify them in the Maryland State Building at the Centennial Exhibition. These collections were afterwards given to the Maryland Academy of Sciences, and contributed much toward completing the fauna of the State previously arranged in its museum.

Here, as elsewhere, the spirit of the time gave a new impulse to inquiry concerning natural history subjects, and a large increase of membership was recorded in the Academy. The Curator or his assistant spent the greater part of the mild seasons in the field, searching for other forms of natural objects, and many strange species were thus brought to notice. Consequently, before the expiration of the first "ten years' lease" of the lot on which the building stood, a most excellent display of the larger proportion of our Maryland fauna and flora was in the Academy's museum, open to every one.

Courses of free lectures, illustrated by specimens from the collections, were given in the hall, both by members, and by professors in the Johns Hopkins University. Some of these lectures were addressed to workingmen, others to teachers, but the most numerous of all to the pupils of the public schools. A large amount of hard work, manual as well as intellectual, was done to make these lectures and explanations pleasing and

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instructive, and they were generally attended by earnest audiences which completely filled the hall.

Beginning with the year 1866, field meetings were held on alternate clear Saturdays during the summer or early autumn. These were usually presided over by an officer or other prominent member of the Academy, who selected for the assemblage a school-house or other building in some part of the country adjacent to Baltimore. The morning was spent by the party, usually numbering from twelve to twenty persons, in collecting or observing natural objects, and an hour or more of the afternoon was devoted to the meeting, where statements or lectures were given relative to the subjects which had attracted the most attention. Most prominent among the leaders in these interesting exercises was Mr. Philip T. Tyson. He being a good geologist, mineralogist and chemist, was ever ready to make happy remarks upon the structure and peculiarities of the region visited. Likewise Rev. John G. Morris was often called upon to recognize some strange butterfly or beetle, and to recite in his attractive manner some striking points in its life history. Other members also, among whom may be mentioned Prof. Geo. L. Smith, Prof. Alfred Mayer, and Col. H. M. F. von Stamp, have assisted in leading the excursionists, and have given instructive and pleasing lectures on botany, hydrography, physical geography, and other subjects introduced at these meetings.

Persons from all parts of the State visited the museum, and were often assisted to obtain information about natural objects which had excited their interest at home.

In 1883 the City of Baltimore passed an act to extend Cathedral Street; the building of the Academy being in the way of this improvement, a part of it was removed to give sufficient width to the street. Accordingly the building was sold by the city, together with the parcel of ground on which it stood, and the Academy not being able to buy both, lost the home which it had enjoyed for so many years.

The cases and collections were then removed to rooms in the basement of the Athenæum Building, rented from the Maryland Historical Society. In these the specimens were displayed as

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well as the space would permit; but the apartments were too dark and gloomy for efficient use, and members of the Academy, as well as other persons, soon became dissatisfied with the inadequate accommodations of the place, and gradually gave up coming to examine the specimens.

In 1884 the Academy was solicited by the Maryland State Commissioners of the New Orleans Cotton Exposition to allow its collections to be taken to that city, to aid the display of the State of Maryland. In an evil hour, permission was generously given, and a contract was executed to secure the specimens and to have them returned in as good condition as when taken away, with their labels and attachments intact. The specimens were taken to New Orleans, and constituted an exhibit which was a matter of great pride to many of our citizens, and a pleasure to multitudes who visited them there. This, however, did not prevent a neglect to fulfil the conditions of agreement between the Commissioners and the Academy. No proper sense of responsibility was displayed by the authorities in charge of the specimens at the Exposition; the boxes were not labelled with the name of the Academy, so as to be recognized as its property; a large number of the specimens were never returned to the Society; and the labels were removed or lost from such as were sent back. Among these were the types of fossils representative of the Cretaceous and Eocene formations, secured by Mr. Tyson while prosecuting his researches relative to the geology of Maryland.

After several appeals to the Legislature of Maryland, and to the City Council of Baltimore, for pecuniary aid in securing a permanent building for its valuable collections, and failing to receive a favorable response, the Academy determined to give up further attempts to establish a public museum.

The Academy has recently decided to relinquish the development of a public museum, and has given to the Johns Hopkins University the specimens and cases which were lodged in its hall, but it does not dissolve because of this disposition of the property. An opportunity is now secured to go forward in publishing the manuscript materials which have been accumulating for years in its records and archives; and perhaps the

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future work done by the members will be more correctly measured by the value of the productions issued in printed form.

With regard to the specimens conveyed to the Johns Hopkins University, it seems proper to enumerate some of the more valuable or interesting. Among the very first of these we would place the young Fin-Back Whale captured in the lower part of Chesapeake Bay, the money for securing which was generously given to the Academy by the late William H. Graham at the solicitation of Dr. Russell Murdoch. More than one hundred dollars were spent for cleaning the skeleton on the bay shore where it was stranded, and for transporting it to the museum on Mulberry Street.

Next may be noticed a collection of Silurian and Devonian fossils from Alleghany County, determined by Prof. James Hall, of Albany, bought from Mr. G. Andrews, of Cumberland, and presented to the Academy by Mr. John W. McCoy. It embraces many large specimens of fucoids and corals, several slabs with impressions of the Cauda Galli, numerous Brachiopods, and some Trilobites. With these were also some fine Ammonites, Ophiurans, and other fossils from the Jurassic beds of England. A very large slab, bearing ripple-marks, was also secured with the series from near Cumberland. A considerable portion of this collection was not returned from the New Orleans Exhibition.

Other important objects are the skull, teeth, broken tusks, ribs, and some other parts of the skeleton of the American fossil elephant, dug from a marsh in Oxford Neck, Talbot County, and presented by Mr. Kirby, who owned the property on which they were found. A broken skull, with fragments of bones, from another specimen of this same species of elephant, were brought from the farm of Col. Edward Wilkins, near Chestertown. Besides these, there was also a tooth of the American mastodon, from an unknown locality.

Rarest, of great value and still unrepresented in any other collection, are the stumps of Cycads presented to the Academy by Mr. P. T. Tyson. All of these were taken from the Upper Jurassic clays of Maryland. One specimen came from the iron-

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ore beds of Mr. J. D. Latchford, near Muirkirk, a second from the vicinity of Hyattsville, and a third from similar clays next the shore of the Patapsco river at the Spring Gardens, south of Baltimore.

Fine and dressed specimens of all the commercial granites of the State were also present. These included cubes of the stone from Port Deposit, from Guilford, Ellicott City, Woodstock, and from near Granite Postoffice. A large and finely polished example of the so-called Precious Serpentine, from the vicinity of Broad Creek, Harford County, and smaller pieces of the paler green, translucent variety of the same rock, from Cecil County, were added to these series. The collection also embraced Breccias, well polished, from the quarries in the Triassic sandstone at Mechanicstown, and other varieties of the same rock from the vicinity of Frederick City and from the ledges near Adamstown, in Frederick County. Other marbles of various kinds—some of them unusually rich in color and pattern of marking, of the wine-red, purple, rose-pink, salmon-yellow, black, and white-veined, of several different types of grain—were represented from Carroll, Frederick, and Washington counties. Examples of the flagstones from the South Mountain, near Boonsboro; also the various sandstones and slates, the white marbles from Baltimore County, and the statuary marbles from the farm of Mr. Rinehart, near Double Pipe Creek in Frederick County, were included.

The chief reptiles and amphibia, and the shells of mollusca from many parts of the State—terrestrial, fluviatile, and marine—and most of the species of fishes from all the hydrographic areas of Maryland and her sea-coast, were present. Likewise there was a series of the crayfish from many of the rivers, lakes, and estuaries of the State, as represented by five species of Cambarus with their several varieties. Besides the foregoing, there were numerous fossils from the sedimentary geological formations, many of which were collected by Mr. Philip T. Tyson from the cretaceous greensands of Bohemia river and vicinity, on the Eastern Shore, and from both sides of Prince George's County, on the Western Shore. From the same source came also multitudes of fossil shells, with some

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sharks' teeth, dug from the Eocene and Miocene marly and sandy strata of Charles, Prince George's, St. Mary's, and Calvert counties. Especially may be mentioned the large Ostrea compressirostra from the region of Piscataway Creek, the Perna and Pectens from Forest's Landing on the Patuxent river, and the bones of porpoises, with the shells of mollusks, from the strata near Cove Point on the Chesapeake Bay shore.

Besides the foregoing, there may be noticed a representative series of the minerals and most of the sands and clays of Maryland which have been employed in the arts. Among the latter were examples of the pure white sand and clay from Mr. Speer's cliffs, on the Severn river, and the Nottingham diatomaceous sand-rock from the bluff at the mouth of Lyons Creek, on the Patuxent river, as also series of stuffed mammals and birds, and a collection of bird's eggs. The Indian and aboriginal relics from the State of Maryland also formed an important feature of the collections of the Academy. An attempt was made to bring together examples of the implements, utensils and weapons of every tribe of Indians known to inhabit the State. This endeavor was not very successful, partly because of the rarity of such objects, and mainly from the difficulty of ascertaining to which group of aborigines the specimens should be referred. Great numbers of arrow and spear heads, skin dressers, and other stone implements, were given to the museum, or collected by members for its use, and representatives of all of these, besides steatite mortars and modern Indian textile fabrics, were made accessible to the public in suitable glass cases. Altogether, the collections even now existing form an important foundation upon which to build a knowledge of the past and present fauna of the State of Maryland.

P. R. U.

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OBSERVATIONS ON THE EOCENE TERTIARY AND ITS CRETACEOUS ASSOCIATES IN THE STATE OF MARYLAND.

By P. R. UHLER.

[Read November 25, 1888.]

The State of Maryland is richly endowed with the remains of past geological ages. Outside and eastward of her mountain chains and rocky hills rest vast deposits of sedimentary materials, sands, clays and earthy mixtures, the lower members of which extend away off beneath the ocean for more than a hundred miles, if indeed they do not connect with similar formations on the coasts of Europe. These broad sheets of earthy material have been derived from the hard and crystalline rocks which constitute the body of the country farther inland. The Piedmont region, lying between the sedimentary Atlantic coastal plain and the Catoctin mountain range, is built of granites, syenites, gneiss, serpentine, mica schists, limestones, and quartzites in great variety. The shattered and displaced parts of these rocks have been successively carried away from their original uplands into depressed levels covered by the waters, and the distribution of their particles has built many types of strata and beds belonging to the Maryland portion of the great coast belt. Slates and felspathic rocks have been ground up by moving waters in rivers, bays and estuaries of the oceanic border, and deep beds of fine mud, later converted into compact clays by uplift above the tide level, have been amassed along the whole eastern side of the State:—clays of Jurassic age and their associated sands now stretch from the broken border of the Archaean rocks tideward over a width of twenty miles. On the outward margin of those strata, the great Cretaceous marl system as recognized in New Jersey, lies piled up in thick beds and strata which spread farther southeastward in a continuous series. The inner limits of this Cretaceous formation begin in Cecil county, a short distance south of Elkton, extend down the shores of Elk river, pass across the neck of land leading to the Sassafras river, from thence to Wharton Creek, where the beds are in part hid by Quaternary sands, and then farther south

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appear in the deep ravines and wells all the way down to near Swan Point and Rock Hall. Keeping on, in a generally southwest direction, the formation reappears on the opposite side of Chesapeake Bay, at Rock Point in Anne Arundel county, crosses to near the head of the Magothy river, continues on to the Severn river south of Cedar Point, extends from thence across the county near the fork of the Patuxent river, and after crossing Prince George's county, reaches the Potomac river about six miles south of the District of Columbia.

The southeastern limits of this formation are much less distinctly exposed, so that the line, as far as it has been possible to trace it out, is very irregular, and in places rendered uncertain by the absence of well exposed sections. An irregular line beginning at the Delaware State border, about one mile south of the head of Sassafras river, in Kent county, and running from thence to a short distance from the mouth of the Chester river below Rock Hall, and then diagonally across Chesapeake Bay to behind Sandy Point, and keeping on across Bay Ridge, is finally lost to view near the mouth of South river, in Anne Arundel county.

The Cretaceous terrane is greatly denuded along the shores of Chesapeake Bay, in Anne Arundel county; likewise in Kent county from near the mouth of the Chester to near the head of Sassafras river.

The formation as a whole has a gentle dip southeastward of less than ten degrees. Nevertheless, in some places, as on the Severn, at the southern end of Round Bay, and near the mouth of Sassafras river, the strata appear almost horizontal. The width of the formation may be stated as approximating an average of nearly ten miles, but it is cut through by the encroachment of Chesapeake Bay between the Eastern and Western Shores.

As in New Jersey, the Laminated Sands form the base of the series, and on both shores of Maryland the beds are composed of very fine white sand, carrying laminae of compact drab or pale brown clay. In these aluminous layers the fossil remains of vegetable matter lie closely packed in great abundance. Films of the leaves of willows, sassafras, viburnum (?), and of many

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other trees and plants, are readily recognizable therein, and the vertebrae of small saurians and fishes have likewise been found mixed through the sand and clay. The principal deposit of this kind occurs near the mouth of Elk river on its southern side, begins about a mile farther back, and gradually ascends until it forms the base of a bluff which rises fifty to sixty feet above the tide on the Chesapeake Bay shore. Up the river, where the deposit is but five to ten feet above the water, it is more or less mixed with the red and white clay upon which it is seen to rest; but in the higher part, facing the bay, the underlying clay lies deep beneath the beach. At this point, coarse pale brown sands, invaded by indurated layers, form the lowest visible portion of this series, and upon these rest about twenty feet of the distinctly laminated sands. Above these, drifts of coarse ferruginous sands and gravels, more or less obliquely bedded in places, rise in thick deposits to near the top of the hill. Throughout the whole length of the laminated exposure, even in its broken and eroded extension up the river, it is fossiliferous, but the fossils have been badly broken by the forces which disturbed the beds. Lying in juxtaposition and grading into these laminated sands, the black micaceous loam of the Lower Marl bed is seen continuing the line of cliffs along the shore until the mouth of Sassafras river is reached. This series of black marls gradually decreases in height as it proceeds towards the southeast, so that it is scarcely more than fifteen feet high on the margin of that river. Over this the characteristic red sand lies piled in beds thicker than the marl itself; and above all, the Quaternary gravels and sands extend up to the surface. Up the Sassafras river the black beds are seen at intervals nearly all the way to its head. Above Betterton, as long as the high cliffs project above the river, the marls are broken by intervals of pale sandy clay mixtures, in which but a small proportion of greensand is visible in occasional patches. Here, too, the ferruginous sandstone and conglomerate crops out in particularly heavy strata. Below this region, baywards, the black marl is heavily loaded near the base with partially stratified lignitic wood. Continuing along the shore towards Howells Point, the black marl beds grade gradually lower, so

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that when Wharton's Creek is reached, these deposits have almost disappeared from view, and lower cliffs appear along the shores. Back of this section the country is low and comparatively level, and the debris of a great variety of rocks goes to make up the apparently Quaternary surface of the soil.

In the deep ravines, near the head of the creeks, the black and green marls make their appearance; and farther south to within a short distance from the Chester river, the greensand marls are accessible wherever the streams have cut deep channels. The characteristic fossil shells, such as *Gryphea vesicularis* and *Exogyra costata*, have been found in the black marls near the mouth of the Sassafras, as well as farther up that stream, likewise at various points along the upper Elk and Bohemia rivers and in the ravines of their tributaries. Near the southeastern border of Cecil county, as also in the eastern part of Kent county, multitudes of *Exogyra*, *Belemnitella*, *Terebratula* and other shells have been taken out of the marls excavated for use in fertilizing the soil.

Crossing Chesapeake Bay to beyond the mouth of the Patapsco river, the same black marls as those on the Sassafras river make their appearance above tide level. At first they are seen in the base of the low hills which rise near Bodkin Creek, and then they become much thicker in the islands and cliffs of the little bay inside the mouth of the Magothy river. They may be observed for a distance of about three miles up this river, back of which the laminated sands come in and extend through to the upper fork of the stream. Crossing the Magothy towards the southwest, these marls form high beds rising from the base of the elevated hills and stretching up the river at least two miles. From that point, continuing still in a southwest direction across the ridge of Broad Neck, the black marls come out in thickest exposures at the lower end of Round Bay, on the Severn river. Here we observe the marl rising thirty to sixty feet above the level of the river, immediately overlaid by mixed green sands, more or less obscured above by ferruginous and gray sands. Over these the Upper Marl strata are seen in thick beds, chiefly composed of coarse gray-green sands which are more or less enclosed in elongated pockets of

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laminar ferruginous sandstone. Here, at the southern end of Mount Misery, the lower marls are very pasty, and form a sticky plastic clay wherever they are penetrated by the water which soaks through the hill. Near the level of high tide these beds rest upon a thin layer of more or less flaky aluminous ferruginous sandstone, beneath which occurs a coarse ferruginous sand. No doubt these beds will contribute a supply of fossils when they become thoroughly investigated, but hitherto they have yielded only a few specimens of *Gryphea vesicularis*, *Exogyra costata*, and a fragment of an *Ammonite*, besides the numerous casts, impressions, and bits of shells which are scattered through their more elevated portions.* The tough texture of most parts of the Lower Marl beds in this region renders the collecting of fossils very laborious, and in such places much excavation yields but a small number of specimens. The greater proportion of these fossils are also in the condition of sand-casts coated with a film of brown iron stain, and others are so involved in the ferruginous sandstone as to be scarcely recognizable. It has, however, been my good fortune during the past summer to find more perfect specimens of these iron-stained casts, which displayed the form and even the delicate markings of the exterior in a scarcely mistakable manner. Among these we may mention *Radula reticulata* Lyell, *R. pelagica* Morton, *Cibota obesa* Whitf., *Mytilus oblivius* Whitf., *Dosinia erecta* Whitf., *Cardium perelongatum* Whitf., *C. eufalense* Con., *Trigonia cerulea* Whitf., *Pteria laripes* Morton, an *Inoceramus*, an *Avicula*, and a *Pecten* which appears to be *P. tenuitestus* Gabb.

The thick shells, such as *Gryphea vesicularis* and *Exogyra costata*, occur in a better state of preservation than is common

*It is with no intention to claim priority over the investigations of our State Geologists in this field that the above names of fossils have been introduced here, since Mr. Tyson had named specimens of both *Gryphaea vesicularis* and *Exogyra costata* from the black beds near Dr. Giddings' farm on Round Bay, to say nothing of his other specimens from the opposite side of the Severn, and also from several places near the Patuxent and Potomac, in Prince George's county. Specimens of these fossils, with names and localities attached, were placed in the collection of the Maryland Academy of Sciences, but by some unaccountable mischance they have disappeared, and besides many others cannot now be found.

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to the others, specimens of single valves having been found with the shelly layers almost intact and the nacreous coating still apparent. As yet, however, no thick and continuous layers of the former, nor of the *Terebratulae*, such as are common to the corresponding strata extending across the State of New Jersey, have been found on the Western Shore of Maryland. Possibly this is owing to the neglect of the farmers of this part of the State to dig the marl for use in agriculture. We find that in but few places have the beds been deeply excavated, and these have been chiefly in the vicinity of the Patuxent and Potomac rivers, in the upper portion of Prince George's county. Some deep wells on both sides of the Round Bay region have penetrated far down into the black marl, or even passed through it to the white sand beneath, but in no instance has the well-digger reported the presence of compact shell-layers in the strata passed through by his boring.

The Cretaceous formation is not of uniform character throughout its full extent in the State of Maryland. Like all the other sedimentary deposits of the Atlantic coast plain, it has brought together more aluminous, micaceous, or siliceous matter in some areas than in others. It seems to have been laid down in a region where the ocean penetrated into bays, gulfs and estuaries deep enough to admit the growth of truly marine forms of life, while at the same time a luxuriant flora decorated the low hills, ridges and promontories which bordered the shores. Likewise, lowlands must have entered between the hills, into which extensive swamps pushed back into the adjoining country. Willows, conspicuous for their size, and bearing remarkably large leaves, spread their branches over the water in the drains. Pine trees of huge proportions grew on the low sandy slopes. Magnolias decorated the marshy borders of the tide-channels. The sassafras flourished on the stiff soils of the open levels, and the viburnum-like bushes grew on the rich loamy hillsides and in the ravines. Incalculable numbers of these vegetable tenants of the soil were thrown down or washed into the deep black muds of this region, and their fragments, charred and soiled by the accumulations of carbonaceous debris, now rest in huge piles at the bottom of the marl mounds.

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Where the thin ends of the black marl strata run lengthened out over the lower slope of the Albirupian coast, a mass of macerated twigs, leaves, buds, scales, barks and bits of numerous kinds of plants and trees lie packed together in hopeless confusion. Early in this period, before the filthy black muds had accumulated in thick beds and when the glauconitic sands were but beginning to be thrown down into the quiet basins, a period of repose allowed the fine white sands to accumulate steadily upon the level beds of the clean swamps and scarcely stained channels. Upon these, at frequent intervals, deposits of aluminous clays, washed from the adjacent Albirupian strata, were spread out in thin layers, binding the sands together in slender bands, and securing therein the numerous leaves, twigs and other fragments of plants and trees which were settling gently down into the shallow waters. Following that stage came one of restless movement of waters, in which coarse sand and a small proportion of gravel were laid down against the sandy slopes beneath the waves. Energetic erosion scooped out hollows in places along the submerged shores of the Laminated Sand belt, and gradually the black mud charged with the decaying remains of plants and trees was raised into high piles, the moundlike forms of which still present bold reliefs in the cliffs which have been cut by the rivers cited, on both shores of Chesapeake Bay. As the cliffs are ascended the green sand becomes more abundant, loses its black or dull bluish color, is more stained by ferruginous matter, and where the country rises stage after stage, the upper surface of each hill becomes more hydrated and changed to a rusty brown sand. On the less denuded ridges, which rise to an altitude of more than one hundred feet above tide, the grayish drier and purer greensand rests in variable strata upon the latter, increasing the thickness to nearly one hundred and fifty feet. Such is the case at and below Mount Misery, on Round Bay, where may be seen a section of almost all the beds, from the Laminated Sands up to the ferruginous depauperated sands of the Eocene formation. Ascending from the bed of the Severn river, we rise to the summit level of the country by two or three stages, representing apparently different periods of denudation. At the bottom of

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the first, plant remains are most abundant; but near the top of this the marine shells, *Gryphea, Exogyra, Ammonites*, etc., begin to appear and become more abundant towards the top. The next higher ridge, farther inland, yields other marine shells, such as *Belemnitella, Baculites, Exogyra* and *Terebratula harlani*, while the third plane of elevation, composed of the gray-greensand, reveals types of *Ostrea, Gryphea*, and *Modiola*, the species of which have not yet been identified.

The Eocene formation now comes into view, and rests over the latter series in the region extending from the Magothy to the South river, where it lies spread out interruptedly in an uneven stratum. Near Chesapeake Bay it rests in the summits of the low hills in a region which has been denuded down to within twenty feet, or even less, of ordinary tide level. On this greatly reduced plateau a few dome-like hills rise here and there above the general surface. Most of these have had the grains of greensand dissolved from the surface, and sometimes to the depth of a few feet inwards, giving them the appearance of incoherent piles of ferruginous sand. In these hills, and especially where the sand has been reduced to a fine snuff-like condition, the fossil shells are packed in countless numbers. The slopes once connected with these hills, which have been divided and ravined by the downward cutting of rapid flowing rills, likewise expose multitudes of the same fossil shells along their faces and in their sides. Still other prominences, more widely eroded, display beds of siliceo-calcareous rock, varying from less than one foot to nearly three feet in thickness, chiefly made up of the remains of molluscous shells. In these aggregations we observe the coarse greensand grains in their normal appearance, but harder than usual, mixed in great abundance all through the stony mass. These indurated layers rest somewhat evenly at a low level, while the beds of shells enveloped by or adhering to the ferruginous sandrock appear in and near the hill-tops. The former fossils are generally clean and not penetrated by ferruginous stains, although siliceous alteration has transformed a notable proportion of the shelly remains into a mineral of glass-like density. This is more particularly the case with shells of medium or small size, for the large *Ostrea*

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compressirostra and overgrown specimens of *Cardita planicosta* have not been found to undergo such a decided alteration. Small examples, however, of both these species, as likewise of *Turritella mortoni, Turritella humerosa, Pectunculus stamineus, Cucullea transversa, Dosiniopsis meekii, Crassatella alta, Nuculana protexta, Axinea idonea,* and various undetermined species, have been found by myself partially or completely silicified. The two conditions of the fossil molluscan shells characterize the Eocene beds in most of their modifications on the Western Shore. This, however, is true more especially of the country which rises from the southern shore of the Magothy river, crosses the Severn below the great highlands of Round Bay, and keeping up to a short distance above Crownsville, bends away towards the southwest until the vicinity of Upper Marlboro is reached. East of this point the same conditions reappear at intervals in most of the hydrated greensand hills, across Prince George's and Anne Arundel counties to below South river, and to within perhaps a mile from Chesapeake Bay. A gradual slope rises and undulates from the lowlands on the Chesapeake shores of Anne Arundel until it reaches a summit of nearly one hundred and twenty feet in the country stretching from Round Bay towards the Potomac river, and before reaching the mouth of Piscataway Creek.

A series of Cretaceous mounds rise high into the central part of the region between the Severn and the Potomac, and give extensive exposures in the deep cuts of the railroad below Millersville. Next we find them in the hills around the head of South river, and then across the Patuxent they form a heavy backbone for all the highlands between that river and the Potomac. This latter river has bayed out its precipitous shores in many places (a notable example of this kind is seen below Fort Washington), so that while leaving a high pile of marl near and above the mouth of Piscataway Creek, it has deeply denuded the country lower down, and produced an extensive lowland in the direction of Mattawoman Creek. The high cliff at the Fort is composed of dark marls, overlaid by the paler grayish olive-colored marly clay of the Eocene formation (?) which becomes more ferruginous and sandy as we approach the

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surface. In the lower part of this upper series of beds, at a considerable elevation above the river (perhaps as much as sixty feet), the indurated sandrock forms a broken uneven vein, in which *Turritella mortoni* and obscure impressions of other shells occur more or less abundantly. In the firm more clayey part of these beds, at a higher level, as well as in the ferruginated portion nearer the surface, numerous hard casts of the large *Cucullea gigantea*, with more or less of the shell attached, are found accompanied by the largest of our fossil oysters, the *Ostrea compressirostra* Say. This last species is also common in the soil of the ravines near their summits, and specimens may be picked up in similar situations at many points along the Piscataway Creek and back into the country of Pomonkey Neck. South of this district the dark blue-black Eocene marls rise into hills of various altitudes, and are cut into abrupt cliffs along the greater part of the Potomac side of Charles county to near Ludlow's Ferry, a short distance above Lower Cedar Point. This marl closely resembles that of the Cretaceous Lower Marl Bed in color and general appearance, but it is less micaceous, not flaky, more aluminous, and composed of finer sand in its upper portion. It grades upwards into pale drab clayey sand, which becomes whiter as it ascends until the stratum of Tripoli, or diatomaceous earth, is reached at the base of the Miocene formation. The dark layer reaches an altitude of thirty feet a short distance above the mouth of Port Tobacco Creek, while the paler overlying portion adds ten feet or more to its thickness in the same region.

Numerous well-known Eocene shells occur in these bluish-black marls, and in the ravines which penetrate the hills back of the Pomonkey; and farther down to near the Mattawoman Creek, beautifully preserved fossil shells may be dug out of the beds. Some of these, such as *Cytherea ovata* and *Dosiniopsis meekii*, are so well preserved that the nacreous color of the shell still remains. In these beds we find also *Crassatella capricranium*, *Cucullea transversa*, *Crassatella alta*, *Cardita planicosta*, *Glycimeris elongata*, *Nuculana protexta*, and *Pectunculus staminеus*. In the more sandy portions of the bed, especially in its upper portions, *Turritella mortoni*, *Ostrea compressirostra*, and

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Cardita planicosta may be found, and in some places are quite numerous.

Ascending the Potomac river, the cliffs composed of that stratum still keep up to a nearly equal altitude until near the mouth of Mattawoman Creek, where they recede from the shore and are more or less hid in the denuded slope of the country farther back. About two miles inland from the mouth of this creek, low abrupt cliffs of the same stratum, twelve to twenty feet in height, have been cut by erosion into the banks of the stream, and in the dense marl, above the level of a man's head, indurated casts of the *Cucullea gigantea* are packed in great numbers. Most of these specimens are destitute of the outer shell, but yet, one in a considerable number is covered with the shell altered to a chalky, more or less powdery condition. This same blackish stratum reappears in the deep cuts made by the Patuxent river, and extends along that stream from above the village of Queen Anne to near Magruder's Ferry, where it passes beneath the water and is lost to view. Like the Potomac, this river has spread out in many places over the adjoining country and denuded wide tracts between the hills, but at intervals of every few miles, cliffs are seen rising thirty to fifty feet above the water. Most of the region along the river, from Priest's Bridge to above Hill's Landing, has been denuded, and the surface is extensively covered by sand, gravel and loam so as to hide the places where the best sections might otherwise be observed; but the ravines and deep gullies back from the river show that the Eocene greensand is present above, and that the micaceous marl beneath is undoubtedly a continuation of the same as that in the adjacent rivers and creeks. The principal difficulty in establishing locally the identity of the underlying strata in this region arises from the tender condition of the casts of fossil shells. The presence of *Ostrea compressirostra*, *Cardita planicosta*, *Turritella mortoni*, and *Pectunculus stamineus*, in the ferruginous sandstone, as well as here and there in indurated marl, shows conclusively that the Eocene strata exist where these are found, as likewise in common with the more abruptly prominent hills of the country farther northeast.

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On the Calvert county side of the Patuxent river, about three-quarters of a mile below Lyons Creek, a section in the abrupt bank rises about forty-four feet above the water and exposes the following strata: at the bottom and up to eight feet above water-level is a rather pure dark greensand marl in which no fossils are observed; next above this ascends twenty feet of more siliceous greenish marl, in which are found casts and shells of *Turritella mortoni, Cardita planicosta, Ostrea compressirostra,* and *Pectunculus stamineus;* above this occurs an indurated siliceous rock, in broken masses, three feet thick, enclosing shells and casts of the above named fossils, accompanied by one or more species of *Crassatella* and the *Cytherea ovata;* and over this rest three feet of the Tripoli, upon which, up to the surface, is a bed, ten feet thick, of sand mixed and covered with fine quartz gravel.

Farther down the river, above Hall's Creek, is another good section, a few feet higher than the preceding, but in which the lower bed of dark marl rises seven feet above the level of the water, likewise exposing no shells, as in the corresponding bed farther up the river, but this time supporting a much thicker bed of Tripoli (about ten feet thick), capped as before by ten feet of siliceous sand, with the gravel mixed and on the surface. It will be noticed that in this exposure the stratum of indurated shellrock fails to appear at the surface, if it is in fact really present. Below Hall's Creek, for a distance of at least one mile, the lower greensand marl stratum is seen to grow gradually lower, and below this point is no longer to be seen. The upper part of the next upper and more sandy stratum, although less conspicuous and more like common surface soil, is apparent still lower down the river wherever the banks rise a few feet above the water. The next great hill cut by the river is at Holland's Cliffs, two miles and a half below Lower Marlboro, and there this mixed greensand forms a bed rising fifteen feet above the level of the water, and is overlaid by the usual Tripoli stratum, which is now thirty feet thick. It deserves to be noticed at this place that above the immense deposit of diatomaceous earth, up to within one or two feet from the top of the hill, there is a bed of slightly ferruginous

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sand, about six feet thick, holding an abundance of the Miocene shells, *Perna maxillata* and *Ostrea percrassa*. Farther down the Patuxent river no other exposures of the upper Eocene marl appear to view, but on the western banks of the stream, above Cole's Creek, the Miocene blue sandy clay takes its place and emerges from below the tide level. From Nottingham to below Naylor's Landing the shores are low, and the Eocene dark marl rises only a very few feet above the water; but upon going back into the country, the densest of all the Eocene quartzites comes to view above the marl, and forms a stratum three or four feet thick, enclosing numerous common fossil shells and their casts.

At a distance of somewhat more than a mile below Pope's Creek, near the base of the cliffs adjoining the Potomac river, another kind of coarse hard quartzite projects in a broken layer of a foot or less in thickness. This variety of rock is also fossiliferous, and contains a small proportion of quartz pebbles, but the only fossils observed therein were small and too obscure to be accurately determined. This rock, however, forms a part of the undoubted Eocene marl bed, which continues up the river and affords the *Cardita planicosta*, *Pectunculus stamineus*, and other characteristic fossils of this formation.

Leaving this region and extending our observations to the neighborhood of Crownsville and along the Annapolis and Elkridge railroad, we find the Eocene fossils mixed through the masses of siliceous limestone scattered over the surface or buried deep in the ferruginous sands and sandy green marl. Here countless numbers of casts, and occasionally shells, of *Cardita planicosta*, *Cytherea ovata*, *Crassatella alta*, *Dosiniopsis meekii*, *Turritella mortoni*, and small specimens of *Ostrea compressirostra*, may be met with over many acres of ground. Here, and extending more particularly towards the southwest, the hills are abrupt, somewhat conical, and superficially composed of ferruginous sand, while beneath them and in every deep ravine the dark greensand or more sandy upper marl makes its appearance. Proceeding down the railroad towards Annapolis, almost every deep cut and sandy hill, when not obscured by Quaternary sand or sandstone, yields Eocene fossils, either on the

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surface or a few feet below it, while loose specimens sometimes occur at a depth of twenty feet below the summit of a hill. Those of the upper levels are apt to be embedded in slabs or masses of ferruginous sandstone, especially in such pieces as prove to have been previously indurated green marl. From these we have extracted very distinct casts, fitting into clearly marked moulds, of *Turritella mortoni*, *Pectunculus stamineus*, *Crassatella alta*, and *Dosiniopsis meekii*. Of the first two, besides *Glycimeris elongata*, we have secured enough of the shell to readily identify the species. Deeper down in the hills the same fossils are embedded in a matrix of more aluminous mixed greensand, and they are often much less firm, or even mere films covering the forms of the original casts; but occasionally, good specimens of these occur, with most of the shell in firm condition. The greater number of the hills above Annapolis show the *Dosinia*, *Turritella*, or *Cardita*, either as cast or mould, enveloped by or adhering to the pieces of ferruginous sandstone which lie scattered over the surface.

South of Annapolis, the most conspicuous deposit of the Eocene fossils appears in the vicinity of the South river bridge. North of the bridge, the *Ostrea compressirostra* lies scattered remotely over the surface of the low eminence or sticks out of the sides of ravines, sometimes accompanied by indurated marl containing specimens of *Dosinia*, *Pectunculus*, and *Cardita planicosta*. Across the river, however, on and in the low hills bordering the drains emptying into Glebe Creek, large beds of the Eocene limestone rest in the marl, and masses two or three feet thick by four or five feet in length project above the surface. These are packed with more or less silicified shells and their casts, among which we have observed large numbers of *Ostrea compressirostra*, *Cardita planicosta*, and incalculable numbers of *Pectunculus stamineus*, and forms which resemble *Crassatella* and *Dosiniopsis*. *Turritella mortoni* and *T. humerosa* are also found here, besides some exceptionally large specimens of *Crassatella alta* and *C. alaeformis* (?). A few blackened sharks' teeth (*Lamna elegans*) occur in the same deposits, accompanied by fragments of the teeth of *Notidanus primigenius*. The fossils here are chiefly in the clean gray greenstone, while those of the

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ferruginous sandstone occur at higher levels, and may be seen in the strata along the banks extending up South river.

Leaving this region and passing over into Prince George's County, we reach the classic ground of American paleontologists, in the vicinity of Upper Marlboro. Here fossil shells abound. High cliffs bound the western branch of the Patuxent river as it passes along the north side of the town, leaving a gorge for the stream, which is reduced to the size of a narrow creek, and flows out into a low plain that has been caused by erosion of the adjacent country. The cliffs are abruptly steep on the southwest side, and display large broken masses of siliceous shellrock, at an elevation of about fifteen to twenty feet above the water. On the northeast side of the creek the cliffs rise more than fifty feet above the bed of the stream, but are set back from it, and are less abrupt, because of the erosion which has cut away the upper portion for a few rods and has left a sloping terrace next the base. These cliffs are composed of greensand marl, which is unevenly stained with iron precipitate above the lower portion, and which becomes more sandy and ferruginous toward the top, the upper surface being covered by a ferruginous clay-loam. Along the lower terrace on the northern side, and at an altitude of about ten feet above the creek, the siliceous shell limestone is laid bare, and rests on, or projects out of, the marl in broken masses, which belong to a stratum originally five or six feet in thickness. These masses are of very variable size, ranging from three to five feet in length and two to three feet in thickness. Some of them have dropped to a low level, and still others rest in the floodbed of the stream. Proceeding down the creek, we find the low terrace studded with masses and boulder-like pieces of this rock throughout a distance of about half of a mile. Below this, the low flat region, leading off towards the marshy ground in the direction of the Patuxent river, gives no further indication of the stratum of rock. Weather and subaerial agencies, such as frost and heat, have been busily breaking up the larger uncovered layers of this silicified shell marl, so that every year reduces it to smaller size and dissolves out much of the shelly matter that is not well indurated. In these masses the Eocene shells are compacted as

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closely as it is possible for them to be placed. In the hardest portions they are held together by an almost cherty matrix, but in the less solidified parts, the shelly mass readily cracks apart and yields the fossils in fairly good condition. Along that part of the bank farthest from the bridge, the shells are densely packed in the moderately loose greensand of the low terrace, and here with a little effort they can be detached in bushels. Bivalves constitute the greater part of the mass, and these are extensively represented by casts, especially in cases where great pressure has been exerted upon the shells. Occasionally a cast is found distorted in a part of the rock where the action of violent compression is perceptible in the surrounding elements. The most abundant shell at Upper Marlboro is the *Pectunculus stamineus* Con., although other genera and species are found in large numbers. *Cardita planicosta* is common in the most indurated part of the rock, and consequently is very difficult to extract. The same may be said of *Ostrea compressirostra* Say, which is here usually of small size, although a few loose valves of this oyster may occasionally be dug out of the loose sand.

Mr. Conrad visited this place as early as 1830, and gave a short general description of it in the Journal of the Philadelphia Academy of Natural Sciences. The latest writer upon the Eocene formation of Maryland, Prof. Heilprin, reiterates the statements of Mr. Conrad and Sir Charles Lyell relative to the agreement of these beds with the Bognor rock of England through some of their fossils, chief of which are this large *Ostrea* and the *Cardita planicosta*. Besides the foregoing species, this locality has yielded nearly all the kinds of Eocene fossil shells thus far discovered in the State of Maryland. Both *Turritella Mortoni* and *Turritella humerosa* have been taken by myself from this locality, and I have likewise secured specimens of *Cucullea transversa*, *Nuculana protexta*, *Nucula parilis*, *Dione ovata*, *Glycimeris elongata*, *Crassatella alaeformis*, and *Pholas petrosa*.

The most conspicuous shell not yet detected in this locality is the large and heavy *Cucullea gigantea* Conrad. Small specimens of a *Cucullea*, more elongated than the *C. gigantea*, and which appear to come between it and *C. transversa*

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Rogers, are occasionally met with in the shell-rock, but, as no perfect examples have yet been secured, a thorough comparison of the two forms has not been possible. With regard to the former, it may be said that more than one hundred specimens of the casts, chiefly from the vicinity of Mattawoman Creek, have been examined by the writer, and they have shown quite a wide range of variation in form and proportions. Some very large specimens were taken from the marl stratum in the ravine back of Fort Washington, which were distorted so much that the beak of one side was bent far out of line from its fellow of the opposite side, while the curve of one valve was flattened, and of the other was expanded so as to appear abnormally convex. In certain other specimens much variation also was observed in the width of the gap between the beaks, while the beaks themselves showed marked differences in length and curvature.

Probably the most variable shell yet taken from our Eocene beds is the *Ostrea compressirostra* Say. Hundreds of specimens of this oyster have passed through my hands, and I have examined large numbers of them of all sizes, ranging from a diameter of less than an inch up to that of eight inches. Among the medium-sized specimens we find those with acutely sinuated scales of growth on the lower valve, described as *O. sinuosa* by Prof. W. B. Rogers, while in the extremely large and thick specimens the scales are wide, feebly or hardly sinuated, and the wrinkles of the same valve nearly obliterated, as in the *O. bellovacina*, or without wrinkles as in the *O. gigas* of England.

Scarcely more than two dozen species of fossil shells belonging to this formation have thus far been discovered within the strata of the State of Maryland. Most of these, however, are characteristic and conspicuous forms, generally bearing only a remote resemblance to the species which preceded them in the Cretaceous marls. Thus, in the genus *Ostrea*, which belongs to more than one of the horizons of both formations, the oblong or elongated simpler forms of the Mesozoic have given place to the broad, wrinkled, and more complicated ones of the Cenozoic. Here, also, as in New Jersey, we no longer

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find *Belemnitella*, *Baculites*, and *Exogyra*, nor are their places supplied by closely related genera. On the other hand, however, we do find two Cretaceous forms, the *Gryphea vomer* and *Gryphea vesicularis*, extending well up into the Eocene beds. Nevertheless, these two exceptions make but little difference in the totality of the fauna, since they are too restricted in range to effect more than a local change in a small part of the assemblage of specific forms. The first of these species seems to be moderately numerous in the indurated gray-green sands and shell-limestone of the cliffs at Upper Marlboro; while of the latter, only two or three broken single valves have been found at remote intervals in the ferruginous sands of the cliffs above the railroad bridge leading across the Severn river.

The middle strata of the Eocene seem to yield the largest and most clearly developed examples of the genus *Turritella*. Two fine species belonging thereto are occasionally found in almost perfect condition, especially in the vicinity of Mattawoman Creek, and less frequently in the decomposing shell-rock near Upper Marlboro. The *Turritella Mortoni* is much the more variable of the two, and occasionally specimens are found which measure five inches in length by nearly two inches in width through the basal whorl. Numerous examples of both species have been examined by the writer, and thus far the *T. humerosa* has always been of a broader form, with heavily carinated whorls and more widely curved base. In general, the proportions of this species have been found to be as three and a half to one, while in a few specimens it has been nearly as three to one. The proportions in *T. humerosa* have generally appeared much more slender, scarcely more than two and a half to one, while the margins of the whorls were destitute of the high carinate ridges which appear so conspicuous in the former species. In this latter the surface is more even, regularly tapering, and only broken by the slender raised lines which wind around the whorls.

From the foregoing statements it will be perceived that characteristic fossils are not lacking to distinguish the formation throughout all of its accessible exposures on the Western Shore.

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On the Eastern Shore, however, it is much more difficult to recognize the Eocene because of the greater degradation which it has suffered over a large part of the surface, and especially since so much of it is apparently concealed by the sand, loam, gravel, and boulders of more recent formations. In Kent County, a few miles north of the Chester river, some of the hills display the mixed green sand below, and gradually become more decidedly siliceous above, until near and on the surface they are chiefly made up of the ferruginous sands, like those of the region adjoining the Severn river in Anne Arundel County. In these likewise we find a few of the same fossils as before. Mutilated or worn specimens of *Cardita planicosta*, *Cucullea transversa*, *Turritella Mortoni*, *Pectunculus stamineus*, and *Ostrea compressirostra* have been found, either loose in the sand or attached to pieces of the ferruginous sandstone which forms broken beds at intervals, and is most perceptible near the ravines. Especially near the heads of the creeks flowing into the Chester river, southwest of Chestertown, and in the ravines adjoining Wharton Creek on the south, and also in those at the sources of Farley Creek, the Eocene beds have been detected with one or more of the species of fossils named above. Probably the best preserved specimens of *Turritella Mortoni* thus far secured from the Eastern Shore have been those from the head of Farley Creek. All the others, as far as they have been examined, were either fragmentary or badly worn.

Here, as on the Western Shore, the Eocene formation begins at base with aluminous, mixed, dark or greenish marls, which become gradually more sandy above, until the upper member is seen to be composed of ferruginous sand, more or less hardened into sandrock, containing the fossils enumerated above. In like manner the whole series of these beds rests upon the sandy marls of the Cretaceous formation, which grow more aluminous and carbonaceous as they are traced below. No precisely drawn boundaries can be given for the entire Eocene formation of Maryland, for its points of contact with other formations are sometimes obscured, either by being covered up with the deposits of later periods, or else by being mixed with the movable materials derived from underlying beds. Thus

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the red sands of the Cretaceous Lower Marl beds rise to the surface in the region of Round Bay, and in contact with these the fossiliferous ferruginous sandstones of the Eocene overlap and mix their sand and broken fragments. A little farther north of the same region, in the sandy belt adjoining the Albirupian, the brown sandstone underlying the lowest bed of the Cretaceous also comes to the surface, and here again the Eocene fossiliferous brown sandstone runs in contact with the similar rock and becomes confused with it. The same thing appears to occur with the brown sandrock of the Columbian formation. This latter pushes south and eastward from the region of the primitive rocks and appears to blend with the brown sandstone of the Eocene territory, or at least to mix its sands with those derived from the latter. Notwithstanding such obstructions, however, the northwest boundary of the Eocene on the Eastern Shore may be said to begin at the Delaware State line, near the northeast corner of Kent County, and to extend west of southwest past Urieville and Fairlee to Chesapeake Bay, near Rock Hall. After crossing the bay it becomes very conspicuous in the prominent red sandhills which rise in Anne Arundel County, above the Cretaceous, east of Rock Creek, and keeps on southwest across the Magothy, Severn, South, and Patuxent rivers, all the way to the Potomac, as before stated.

As far as has been ascertained, the southeastern boundary of this formation begins on the Eastern Shore near the head of the Andover branch of Chester river, next the Delaware line, and extends, in an interrupted order, west of southwest past Sudlersville, Churchill, and Centreville, and taking in Kent Island, crosses to Chesapeake Bay. On the Western Shore it starts at the mouth of West river, and following the trend of the bay shore, keeps on through Calvert County to above Lower Marlboro, and then passing across to the Potomac river near Ludlow's Ferry, as before mentioned.

This formation, in its fullest accessible extent across the State of Maryland, may be said to have a width of nearly twelve miles, and this estimate does not include a few outlying patches of the ferruginous sand and sandstone lying apparently detached from the inner border of the main body of strata.

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The foregoing observations are the results of studies conducted at remote intervals during the past twenty years, at first in conjunction with Mr. Philip T. Tyson, with the view to settle with greater precision the boundaries, detailed composition, thickness, and origin of the sedimentary formations of the State of Maryland. Even at this late date, after so much laborious work has been done in examining the hills, river beds, and ravines, many pressing minor questions yet remain to be settled. The position and principal relations of each great group seem now to be about settled, and the work of the future will have reference to the more minute details, and to filling out the list of fossils.

One problem of great interest, however, deserves some notice before closing this subject, and that is, the relation of the mixed greenish and ferruginous marl sands to the fine gray slightly argillaceous sand as seen between Aisquith's Creek and the Mill-pond above Chase's Creek. The upper portion of these ferruginous marl sands holds specimens of *Ostrea compressirostra* and casts of *Dosiniopsis Meekii*. If, therefore, we include the whole body of this great member, which stretches all the way from the mouth of the Severn to the Mill-pond and then rises into the hills, we shall have to restrict the Cretaceous of the Western Shore to a width of country not much exceeding three miles.

The black deposits of the Lower Marl beds, in this region, extend from near Cedar Point to Aisquith's Creek, and next above them in the river bluffs ascend the lower argillaceous green sands, above which are seen the fine gray slightly argillaceous sands, overlaid by the ferruginous marl sands, and these latter continue up to the well distinguished Eocene sands and sandstones near the surface. The fine gray slightly argillaceous sands seem to mark a deposit between the two formations; and, being composed of such loose materials, it would readily have blended with the soft marl laid down over it, and thus the line of contact might have been left undefined. Much investigation is still needed to settle the exact thickness of these two groups of strata, and to determine precisely the conditions which prevailed in Maryland at the close of the Cretaceous period.

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The study of both these formations is much hindered by the bold reliefs of surface which arise throughout most of the region. Steep hills have been cut out of a moderately inclined slope, across the strike of which deep rivers have dug their way abruptly through thick bodies of strata. At right angles to these latter, creeks and branches of various kinds penetrate deep into the adjacent land, and form at frequent intervals an almost impassable barrier in the foul bogs which fill the depressions on their borders. Next these, on the lowest slopes of the hills, almost impenetrable thickets of bushes, vines and greenbriar cover the surface and conceal the mire that rests only a few feet lower down. Between these drains, the hills rise in cliffs and present the best exposures of the beds and strata. A full section, however, cannot be obtained by referring only to the steep bank rising from the river's brink. Ascending to the top of such an exposure, an abrupt incline appears a few feet or rods farther back, and upon examining this, often a third stage of elevation is seen rising high above this second base of erosion. The first section of such an exposure usually displays the component beds and strata in their actual form, but the next stage of ascent is apt to be covered by the loose materials of its own upper portion, or to be partly concealed by the shifting sands carried from the summits of the hills higher up. Thus the Eocene sands often cover most of the slope of an upper terrace, settle down upon the movable elements of the next stage below, and form the red mantle which disguises the hills as they are viewed from the surrounding country.

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NEW GENERA AND SPECIES OF AMERICAN HOMOPTERA.

By P. R. UHLER.

[Read October 14, 1889.]

Fam. JASSIDAE.

SCAPHOIDEUS. New genus.

Form of *Phlepsius lacerdae* Sigt. Head triangular, flat above, vertex almost as long as the width between the eyes, subacuminate at tip, the base deeply sinuated; front longer than wide, deltoid, with the sides near the tip moderately curved, tylus liguliform; cheeks broad, curved, expanded to behind the middle of the eye, acutely tapering at tip and hardly enclosing the entire lora, the lora diagonal, acute at each end. Antennae long and slender. Pronotum sublunate, more curved anteriorly than sinuated posteriorly. Wing-covers moderately narrow, longer than the abdomen, curved, valvate, the costal areole long, narrow, destitute of cross-veins, followed by a gradually widening cell, beyond this are four apical cells of large size and mostly broad triangular figure; wings with the two apical middle areoles long and narrow, narrowing at base towards the cross-vein. Abdomen moderately long and narrow.

The name of this genus has reference to the somewhat shovel-shaped figure of the head. It comes very near in form and venation to some European species of the genus *Platymetopius*, as restricted by Fieber, which have the short head. Our genus, however, lacks the two minute cells at the apex of the costal areole, and has longer falcate genae which hardly reach around the tip of the lora. The eyes are also of the triangular diagonal type, extending well back on the curved sides of the pronotum.

1. *S. immistus.*

Jassus immistus Say, Jour. Acad. Philad. VI, p. 306. This is a very common and variable species, widely distributed throughout the eastern United States, from Maine to Florida, and from Ontario, Canada, all the way to central Texas. In Maryland it occurs on oak bushes during August and September.

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2. *S. intricatus.* New sp.

Form of *S. immistus*, ivory white or yellowish, with the interior margin of the head more thickened than in that species, and the submargin destitute of the slender line; vertex conspicuously white, with a diagonal pale brown callous streak over the antennae; front obsoletely striated above; antennae piceous, testaceous at base. Pronotum with a few indistinct brown points across the anterior portion, and some cloudy spots near the base. Scutellum pale yellow, with a brown spot, or spots, on the basal part of the disk, but sometimes without spots. Beneath and legs white, the tarsal nails black, posterior tibiae brown at tip and with black dots at the base of the spines, a wide black band covers the middle joint of posterior tarsi. Wing-covers whitish hyaline, with a large fulvous spot on the middle of the clavus, on which is placed a diagonal large brown comma; on the corium, exterior to these, is a large irregular dark brown, double streak, followed behind by a white spot, next the nodus is a cuneiform dark brown spot, connected with the brown veins of the discal and apical areoles, the two areoles next behind this white, followed by a broad fulvous patch across most of the membrane, the apex with a large dark brown spot next the white apical margin.

Length to end of abdomen 5 millims; to tip of wing-covers 5½–6 millims. Width of pronotum 1½–1⅔ millims.

This has hitherto appeared as a more uncommon species than any one of the others here enumerated. It lives on *Crataegus* bushes, and may be obtained in the adult stage from the early part of August until the middle of October, in sheltered places. I have taken specimens in the Piedmont region of Maryland and Virginia in September and October, and on the Atlantic Coastal plain in Maryland and New Jersey in August. The ivory white color of the head and pronotum contrasting with the chestnut brown markings of the wing-covers gives it a very conspicuous and attractive appearance during life. It has occurred to me only in single specimens at a time on the bushes which it inhabits.

3. *S. jucundus.* New sp.

A beautiful tawny-yellow species, with semi-transparent wing-covers having a tinge of yellow, especially near the inner and

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apical border, and with oblong deeper yellow spots in the large areoles on and beyond the middle; the tawny clavus is interrupted by a longitudinal series of three or four white spots, and the base of the apical series of areoles has a group of four round whitish spots; postnodal areole oblong, with an oblique vein at base and a curved one at tip; the central apical areole largest, triangular, with the inner narrow end truncated, the apical areole next the postnodal one five-angled, placed transversely; the apical inner areole bounded inwardly by a brown vein with a paler arrest on the middle, discoidal medial areole bounded at base and tip by dark brown veinlets, as also the postnodal and the apical cell next beyond it. Head pale testaceous, unspotted beneath, marked with two large orange spots above, and more or less interrupted with orange around the borders, the middle with a sharply defined white line, anterior margin a little recurved, bounded by a slender black line which is interrupted in the middle, and with another, complete, black line just below the margin, and crossing the eyes in the dead insect. Antennae piceous, testaceous at base. Pronotum suffused with orange, having a transverse curved series of four or more white spots before the impressed curved line, and with three pale longitudinal lines behind this area, a whitish spot appears before the humeral angle, and the lateral and posterior margins also white. Scutellum tawny with the lateral margins interrupted ivory white, and with a series of white spots each side of the middle. Underside of the entire body whitish testaceous. Legs pale testaceous, spines of the posterior tibiae placed on black dots, apex of each tarsal joint and also the nails black. Veins of wings dark piceous.

Length to end of abdomen ♂ 5 ♀ 5½ millims; to tip of wing-covers 5½–6½ millims. Width of pronotum 1½ millims.

This little beauty is quite variable in depth and amount of color, and also in pattern of markings. The female sometimes has a double series of white spots on the clavus, and various other rounded white spots scattered over the corium. A vividly colored variety has the vertex bright orange with a wide white band across the base, and also with the pronotum of the same orange color, crossed by a pale band.

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4. *S. consors.* New sp.

Dull pale clay brown, inscribed with white and fuscous, form of *S. immistus*, but with less acute vertex. Head more rounded than in the preceding species, the vertex less depressed, having a yellow sinuous line adjoining the anterior margin bordered before by a slender line, and behind by a black line which is enlarged at the corner of the eye; next the apex is a dusky spot carrying a yellow dot, behind which a yellow double line runs back to the base and then bends outward in a hook; front pale brownish, darker above, where it is crossed by three or four yellowish lines. Eyes pale brownish, margined behind with white. Pronotum pale grayish brown, transversely wrinkled, with an obsolete pale middle line which is widened at the posterior extremity; in each anterior angle is a large yellowish spot, carrying a dark brown dot, the anterior margin orange with two yellow dots on the middle. Scutellum orange yellow, finely wrinkled, having two yellow remote dots at base, two gemmate ones near the apex, and the lateral margin interruptedly yellow. Beneath and legs testaceous. Apex of last tarsal joint, nails, dots at base of spines on posterior tibiae, tip of the same tibiae, and two broad tarsal bands black. Wing-covers tinged with pale fulvous and with whitish round spots distributed lengthwise on the corium, veins brown, the basal and apical cross-vein of the postnodal cell, that of the tip of adjoining apical cell, a streak at the marginal end of the sectors on the clavus, and tip of clavus dark brown; apical end of membrane broadly bordered with smoke brown, a few pale brownish clouds occupy the disks of the areoles on the middle. Wings hyaline, with brown veins. Segments of the tergum light brown, with the sutural margins, especially below, bright yellow.

Length to tip of wing-covers 5¼–5¾ millims; to end of venter 4¾ millims. Width of pronotum 1½ millims.

A novel little species, of which but a few specimens have thus far occurred to me in Maryland. It lives on the Spice bush, *Linderus benzoin*, in late summer and autumn. A specimen of the female was sent to me from Waco, Texas, by Mr. Belfrage.

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Fam. ISSIDAE.

DYCTIDEA. New genus.

Oblong, subelliptical, wing-covers carried almost horizontal, partly opaque. Head subquadrangular, the vertex transverse, arcuated, sunken, very short, separated from the front by a high carina; front subquadrangular, emarginated below, elevated above the line of the eyes, the medial carina pubescent, and higher than those of the lateral margins, the superior carina arcuated; epistoma prominently convex. Pronotum transverse, lunate, the anterior margin carinated and curved far forward, more than half way to the anterior line of the eyes. Eyes lateral, prominent, hemispherical. Antennae with the basal joint thick, cylindrical, about half as long as the eye, the second joint very short and thin, carrying a long slender bristle. Scutellum triangular, wider than long, with three incomplete thick carinae. Wing-covers oblong, net-veined over most of the surface, with the costal margin nearly straight, and continuous with a flat cross-veined border which is carried all the way around the membrane, and from thence to the base of the clavus; the costal area long, narrow, and crossed by remotely placed veinlets, veins of the membrane coarse, oblique, with reticulate branches. Legs stout, the posterior pair long, with strongly keeled posterior tibiae carrying three or four spines on the outer edge and a chaplet of smaller ones at tip, posterior tarsi broad, depressed, the two inner joints armed with a spine each side at tip. Abdomen compressed above, rounded beneath.

1. *D. angustata.* New sp.

Oblong, parallel-sided above, dull blackish piceous, greenish on the sternal segments and upper part of front. Face smooth, margined with testaceous, the middle carina pale at both extremities, and the vertex with a pale impression on the middle. Eyes dark brown slenderly edged with testaceous. Epistoma and rostrum brown-piceous. Pronotum somewhat uneven, depressed, bordered with and having the middle line testaceous. Scutellum more or less bordered with testaceous, and pale at tip. Sternum and venter greenish, with some dark vestiges on the middle of the segments. Legs pale piceous, paler on the

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knees and tarsal joints. Wing-covers opaque, black, with the costal area and expanded border unevenly spotted with white or testaceous, the inner border, sutures, and some minute dots on the longitudinal veins pale brown. Tergum brown, with a pale streak on the middle and subcarinate line. ♂ ♀.

Length to tip of wing-covers ♂ 4½ millims, ♀ 5 millims; to tip of venter 4–4½ millims. Width of pronotum 1½–1¾ millim.

A pair of these curious little insects were sent to me from Los Angeles by Mr. Coquillett. The genus resembles in form the more delicate *Aphelonema*, but it belongs to that part of the group which approaches *Tylana* in the reticulated arrangement of its venation, and the composition of its pectoral and abdominal areas. The pronotum of the female is a broad crescent projecting forwards in a well-rounded curve, while that of the male is more angular in front.

2. *D. intermedia.* New sp.

Somewhat more robust than the preceding species, with the wing-covers a little convex behind the middle. Face pale greenish brown, becoming fuscous along the sides and on the end of the epistoma, superior cheeks and all of the pectus beneath the upper border yellowish green. Pronotum more blunt than in the preceding species, in the ♀ almost truncate on the apical portion of the anterior margin, and on the middle of this indented, the raised lines darker than the general brownish surface. Scutellum pale brown, darker on the disk and middle carina. Legs dark brown, pale on the base and apex of the femora. Wing-covers black-piceous, with a large hyaline triangular spot spreading across the clavus upon the adjoining cellules, a band of the same color crosses the corium behind the tip of clavus, and a similarly colored spot curves near the inner part of the membrane, the veins all dark brown, and the flattened border all around the wing-cover interruptedly brown and hyaline. Tergum dull brown, with series of pale brown spots along the sides, and a subcarinate interrupted line of the same color along the middle; venter yellowish, dark brown on the apical segment. Length to tip of wing-covers 5–6 millims; to end of venter 4½–5 millims. Width of base of pronotum 1¾ millim.

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Three females from the vicinity of Los Angeles were sent to me by Mr. Coquillett for examination and study.

DICTYOBIA. New genus.

Form similar to *Neaethus*, having the wing-covers sloping, broad, and subangulately expanded before the middle, ramosely reticulate, with the areoles large and irregular. Head narrower than the pronotum, the vertex carinated in front and on the sides, posterior margin broadly sinuated, front quadrangular, carinate on the middle line and superior and lateral margins, sinuated below, almost truncated above. Pronotum short, lunate, somewhat sunken, with the margins a little reflexed. Scutellum hardly as wide as the pronotum, obsoletely carinate on the middle, and with an ovate callosity next each basal angle. Legs stout, with the tibiae keeled and spined as in the preceding genus, the posterior tarsi flattened, and with a spine at the outer angle of the two basal joints. Wing-covers more broadly margined all around than in *Dictydea*, with the cells of the apex, exteriorly, much longer than the rest, basal area of the clavus crossed by a single veinlet, the principal area crossed by five veinlets, of which the three apical ones form a group by themselves. Abdomen stout, subconical, almost carinate above, compressed at the posterior end.

D. permutata. New sp.

Obmitrate,* fuscous, or fusco-piceous, marked with testaceous. Head broad, truncated, moderately polished, with the carinate lines and space beneath the eyes more or less pale; eyes brown; antennae piceous, having the border of the socket well raised, the basal joint almost spherically enlarged at tip, the second joint very short and narrow, and the apex consisting of a long, slender bristle; vertex sunken, having the middle line, lateral and posterior margins testaceous. Pronotum with the anterior margin testaceous, slenderly recurved, the middle line also testaceous, percurrent with the line on the head, and also with that on the scutellum, the surface each side of middle indented. Scutellum with a dark brown callosity on each basal

* This term is here used for a figure in the form of a mitre, in the reversed direction.

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angle, set on a paler spot. Pleural pieces fuscous, bordered with pale yellow, the sternal segments and coxae greenish yellow. Legs piceous, minutely pubescent, pale yellow on the knees, tip of tibiae and tarsi. Wing-covers blackish piceous, with a large hyaline spot at the basal inner angle, a hyaline band, widening exteriorly, behind the middle, a shorter band of like color next the tip of membrane, and the marginal expanded border likewise hyaline with the cross veins mostly invaded by brown stains; veins dark brown, but generally paler, or interrupted with pale piceous where crossing the pale bands. Ventral segments more or less widely bordered with greenish yellow, tergum with a yellow dorsal line of interrupted marks and with series of obscure spots each side.

Length to tip of wing-covers ♀ 5, 6 millims. To tip of venter ♀ 4½–5 millims. Width of pronotum 2 millims.

Five specimens have thus far passed through my hands, and most of these were captured by Mr. Coquillett in the vicinity of Los Angeles, Cal. A single specimen, labelled simply California, was sent to me by Mr. Henry Edwards.

I have failed to observe wings in any of the foregoing genera or species.

Dictyonia. New genus.

Blunt and wide; wing-covers transparent, carried almost vertical, as long as broad, flat, wide, ovoid, with exceptionally few and large areoles. Head blunt, subtruncate, set so deeply that the eyes almost touch the base of the wing-covers; vertex transverse, very short, carinate on the anterior margin, the posterior margin more prominently carinate and broadly sinuated, surface sunken, indented each side; front a little curved, middle line with a blunt carina, and the lateral margins distinctly carinate, inferior margin deeply sinuated, the epistoma strongly convex. Pronotum bluntly lunate, depressed, a little longer than the vertex, enclosed each side by the eyes. Scutellum short, triangular, somewhat sinuated each side. Tibiae grooved and carinate edged as in *Neaethus*, the posterior pair with spines exteriorly, and the posterior tarsi depressed, with the angles of the two basal joints produced into spines. Wing-

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covers margined all around with a very narrow border, crossed by divaricating veinlets which form groups at the ends of the apical veins, veins coarse, basal areole oblong quadrangular, with the ends oblique, followed behind by two small angular cells, behind which are two very large irregular areoles, followed by the transverse series of six areoles, the two middle ones of which are the largest of all and irregularly quadrangular in form, the apical series consisting of six or seven cells, graduating smaller towards the inner margin of the wing-cover.

D. obscura. New sp.

Form as seen from the side broad ovate, with the transverse diameter almost equal to the longitudinal. Color very pale brownish yellow, marked with brown. Face margined with pale brown, which continues upon the vertex in a line adjoining the eyes, medial carina prominent, bright yellow, becoming narrower above and ending in a minute point at the vertex; eyes brown, prominent, subglobose, set in a wide orbit which is brown behind; rostrum pale brown. Pronotum pale yellow, brownish on the sides, the anterior margin narrowly recurved and carried far forward on the head, with a curved impression, carrying two indented points just back of the border. Scutellum broad, bluntly triangular, deeply impressed near each basal angle, the angle broad, tabulate, brownish. Wing-covers broadly, unevenly spread with brown on the apical division, with a large oblique spot of the same color near the base, and with a few blackish points on the apical and costal raised edge. Beneath pale yellow, polished. Legs pale yellow, with a brown mark on the coxae and base of femora, and the tips of tibiae and tarsi darker brown. Length to end of wing-covers, 3½–4 millims; to end of abdomen, 3 millims. Width of pronotum, 1 millim. This abnormal and curious insect has thus far been obtained only in Central California and near San Francisco. One specimen was given to me by Mr. Henry Edwards, and another was captured by James Behrens. It bears some resemblance to *Neaethus* Stal, but differs widely from that genus in the reduced number of its areoles and their exaggerated proportions on the central portion of the wing-cover.

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DANEPTERYX. New genus.

Body robust, as in *Issus* and *Tylana*, but with narrow, strap-shaped wing-covers and contracted angulate head, which give the insect the appearance of the Orthopterous genus *Tettix*. Vertex oblong quadrangular, with the anterior angles acutely prominent, and the front margin between them almost angulate; the middle line broadly sunken, lateral margins carinately elevated; front oblong, with the sides and middle line prominently carinate, emarginate above and below; clypeus convex, conical, carinate on the middle line, the labrum completing the cone, and stiffened each side by a thick carinate rib extending along from the cheek; rostrum long, and at base nearly equal to the labrum in thickness; antennae globose at base, placed as usual below the eye, and carrying a very slender seta; eyes subglobular, emarginate beneath. Pronotum transverse, short, depressed on the disk, the anterior angle subacute, with the sides narrow, curved downward, with a tabulated space behind the eyes, and the upper surface crossed by five slender, longitudinal lines. Legs normal, the femora moderately compressed; posterior tibiae prismatic, carrying a series of four or five teeth besides the chaplet of spines at tip. Wing-covers thick, opaque, subligulate, but triangularly widened at base, and tapering at tip where they become acutely rounded; the elements of venation are arranged in continuous longitudinal series, excepting two short series of cells which run from the base along and parallel with the clavus; the areoles are all small, numerous, mostly quadrangular on the outer half of the length of the wing-cover, while those of the inner half are irregular, because of the ramose irregularities of the longitudinal veinlets; the costal border crossed by numerous veinlets. Wings rudimentary. Scutellum triangular, carinate, acute at tip. Abdomen obese, carinated above.

D. manca. New species.

Grayish fuscous, pubescent, tinged with white, pale yellowish brown when immature. Upper surface and wing-covers scabrous. Head rough, a little hairy, the carinate lines blackish, interrupted with white; lower part of cheeks and epistoma

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pale testaceous. Legs and tarsi spotted with fuscous. Pronotum a little pale about the margins. Pectus hairy, unevenly fuscous, marked with a white spot above the orifice of the mesothoracic spiracle. Underside chiefly paler than above, sometimes testaceous, or white on the posterior coxae. Wing-covers ashen gray, with chiefly black veins, the veins of the costal and inner border coarsely interrupted with white, while those of the discal portion are minutely specked with white. Anal and genital segments more or less rusty yellow. Length to tip of wing-covers, 4¼–5 millims; to end of venter, 3½–4½ millims; width of pronotum, 1⅝–2 millims. This insect has thus far been reported only from Los Angeles, California, from which place several specimens have been referred to me for examination by Mr. D. W. Coquillett.

It is the most remarkable insect of the order which has yet been discovered in North America. The wing-covers lack the membranal area which is so often present in the insects of this group, while the form of these organs and their type of venation lead to the Orthoptera of the group *Acrididae*, and thus give us an ancestral type which might well be a remnant of the old Fauna prevalent in the Rocky Mountain region during the Tertiary period.

CICADIDAE.

Tibicen Latr.

T. cupreo-sparsa. New sp.

Form of *T. striatipes* Hald. Dull piceous black, the upper surface closely spread with minute brassy scales and short hairs, the under surface more closely silvery pubescent, including silvery scales on the pleurae and venter. Head normal, blunt-triangular, with the median line grooved as far as to the anterior ocellus, the latero-basal areas triangular, indented, and bounded next the ocelli by a curved sulcus; vertex separated from the front by a transverse impressed line, which terminates in an oval impression behind each antennal lobe, base of upper part of front orange yellow, the front blunter and more convex than in *T. striatipes*, bordered with orange, and deeply grooved on

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the middle line, antennal lobes broad triangular, with a curved, short, carinate median border; inferior cheeks and labrum black, hoary pubescent, rostrum piceous, somewhat yellow at base; antennae steel blue-black. Pronotum transverse, with the anterior and posterior margins yellow, and the lateral margins oblique, recurved as far as to the shallow notch before the moderately produced humeral angles, base of the humeral angles with a forked wrinkle; anterior angles bluntly rounded; the mesonotum rather evenly convex, covered like the adjoining segments with bronze scales, the base with a short yellow streak each side; mesothoracic cross yellow, with black, long, acute arms, bounded in front by a wide depression, and with the posterior excavation wide and shallow, the area behind the cross yellow; pleural segments pellicular, testaceous, piceous on the middle, hoary pubescent; acetabular processes of the hind legs long, auriculate, white; opercula small, transverse, pediform. Legs piceous, hoary pubescent, more or less orange on the sutures, tibiae and undersides of the middle and posterior femora. Hemelytra piceous, opaque as far as to the first series of transverse veins, which form a curve of a pale color across the entire width; areoles wide, veins stout, black, the opaque area spread with minute bronze scales and pubescence, the costal margin and exterior vein of the basal areole pale yellow, the radial areole long, acute at tip; base of both wing-covers and wings orange, the membrane hyaline, tinged with brown; wings slightly tinged with brown, and with black veins. Venter piceous, silvery pubescent, the posterior and lateral margins of the segments rufous. Length to end of venter 14–15 millims; to tip of wing-covers 18 millims. Alar expanse 36 millims. Breadth of base of pronotum 6–6¼ millims. Two females are the only representatives of the species thus far known. They were captured near Los Angeles, California, and were sent to me for identification by Mr. D. W. Coquillett. The male is still a *desideratum*, which it would be particularly important to secure, as the forms of the genital pieces and sonory segments of this sex afford important structural characters.

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ADDITIONS TO OBSERVATIONS ON THE CRETACEOUS AND EOCENE FORMATIONS OF MARYLAND.

By P. R. UHLER.

A closer inspection of some localities in which characteristic exposures of the Cretaceous and Eocene formations of the Western Shore of Maryland exist has brought more clearly to view the real structure, relations, and modifications of the two formations, and has given an insight into the methods to be adopted in the study of the deposits.

An examination of many parts of their base lines and points of contact over the principal tracts of country, between the bayed-out estuary of the Magothy river and the Potomac at Fort Washington, shows that the Cretaceous Lower Marl beds rest directly upon the denuded and broken body of the Albirupean formation, at almost all accessible places. Along the Magothy and Severn rivers, the Cretaceous marl strata rest upon a moderately thick stratum of ferruginous sandstone, which in turn overlies the white sand, or at the inner boundary the sandy surface of the white clay. On the Patuxent river, however, the Cretacaous Lower Marl beds rest upon the mixed, disturbed surface of the Albirupean white clay, which is much thinner than in the foregoing localities. Along the Potomac river no exposures of the Cretaceous marl strata appear between the Eastern Branch and Swan Creek, and the Albirupean white clay forms chiefly a thin stratum, directly overlaid by the Quaternary, possibly of the Columbia formation. This last series of beds spreads from the margin of the Potomac back upon the highlands, and hides from view such remnants of the Cretaceous or Eocene beds as might have remained on the less denuded parts of the terraces after the great baying-out of this tract of country had taken place.

South of the Eastern Branch a narrow stratum of the Albirupean clay is exposed in the banks of the Potomac river. This stratum overlies the Baltimorean dark or variegated clays that rise from beneath the level of the water, and which occur at

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intervals all the way down to the Fort Washington peninsula, under which they pass to reappear near the base of the cliffs on the north shore of Piscataway Creek. The Albirupean clay stratum has also suffered very unequal denudation and erosion in the old basin south of the Eastern Branch. It appears to be only two to five feet thick north of Rosier Bluff, while at the bluff itself it forms a high, mixed, irregular bed, apparently about ten feet in thickness. Below Fort Foote it is again reduced to a thin belt, and is scarcely observable at points leading in the direction of Broad Creek. Back in the country, however, it seems to rest in heavier beds, and its exposures vary in thickness at almost every change of locality. A similar irregularity of surface characterizes this formation near the Patuxent river, while at its best exposed position along the Severn river, north of Round Bay, it stands almost complete in high bluffs, with the white sand towering above it in monumental piles.

The Albirupean, wherever observable in place, shows a dip of more than ten degrees, but along the Potomac river its dips cannot be satisfactorily studied, notwithstanding the fact that it can be discovered at or below tide as far down as to the vicinity of Pomonkey Creek, in Charles county. South of the Piscataway, however, the white Albirupean clay is not always strictly in place, and its representative is rather a mixed clay which is partly derived from the upper part of the Baltimorean formation. The white clay keeps on steadily beneath the surface, so that on Pomonkey Creek, at a distance of two miles from the mouth of Piscataway Creek, it is reached at a depth of nearly forty feet below the surface of the Quaternary beds, which there rise about twenty-five feet above the level of high water.

It is, accordingly, over the surface of this uneven bed of clay that the Cretaceous system of Maryland is laid down. Such conformability as it appears to have with the underlying Albirupean is only of that kind which might have resulted from the deposition of soft and freely movable material upon a yielding surface. Viewed comprehensively, however, so as to take in its full width along the Severn, Patapsco, Northeast and Elk rivers, the Cretaceous is observed to dip at a much lower angle

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than the Albirupean, and to be composed chiefly of other elements, put together after a different mode of construction. In the Cretaceous of Maryland no strata of homogeneous clean clays appear, nor do we find extensive beds of unsullied sand, such as form chief members of the underlying formation. Originally, this system of Lower marls must have formed a continuous sheet of friable and plastic materials scarcely less than ninety feet in thickness. At the present time it is not observed to be more than about seventy-five feet thick in any single exposure, but in nearly all the places where it has suffered least denudation it lacks the whole or a part of some one or more of its members.

On the inner border it is more highly inclined than along its average base level, as may be seen on the high hill, called Maulden's Mountain, at the mouth of North-East river, where the Lower Marl beds rise about one hundred and fifty feet above tide to pass over the ridge of Albirupean clay. No other such conspicuous example of this kind occurs within the territory of Maryland, but the same series of beds rise to a somewhat less altitude to pass over the Albirupean hills north of Round Bay, near the Severn river. Pursuing these strata along the river last mentioned, as also on the exposed banks of the Magothy and Patuxent rivers, we find them lying nearly horizontal, and observable over a width of hardly more than three miles, while on the Eastern Shore they are conspicuous in the cliffs of all the rivers, from the North-East river to the end of the southern side of the Sassafras.

In the flats or terraces along the bayed-out shores of the Potomac river, in Prince George's and Charles counties, no outcrops of the Cretaceous marl beds have yet been reported. In that portion of the region between Washington and Broad Creek the country is composed of high hills of clay, sand, gravel, and small boulders of apparently Quaternary age, so that we are compelled to go north and east of the ridge on which Forestville stands to find ravines or margins of streams where the beds are laid open. The most southward exposure of any member of the Cretaceous of Maryland, thus far noticed, appears in the ravines of Charles county, above the bend in Mattawoman

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Creek. This is probably a member of the Middle Marl Bed, and has thus far yielded no recognisable fossils. The northern boundary of the Cretaceous, west of the Patuxent river, begins in dark greensand beds only a few feet thick, resting in low domes, at a distance of about a mile north of Collington. From that point it appears at irregular intervals in deep cuts of streams and hillsides east of Buena Vista, and crossing the forks of the western branch of the Patuxent, it is lost in the hills north and east of Forestville. It is next found on Tinker's Branch, and finally reaches the Potomac river in the high tongue of land at Fort Washington.

The bluffs running back from the river along the north shore of Piscataway Creek being very steep, afford the best sections to be obtained anywhere in the region west of the Severn river. Here, however, we find only the two members of the Lower Marl series, without the underlying thick stratum of sandstone observed on the Severn, and destitute of indications of the Laminated Sands. A high cliff starts in front of the fort, and keeps on with eroded intervals for a distance of fully three miles, and then blends with the highlands further back. At the beginning of this high tongue of land we observe the black Lower Marl Bed at an elevation of twenty-eight to thirty feet above the water, keeping on with almost unbroken continuity for about three-quarters of a mile up the creek. After this, a bayed-out space of more than a quarter of a mile in width cuts the stratum, and it next appears as a boundary of this interval in the dome-shaped end of a hill, from which the overlying greenish marl has been denuded. Farther up the stream it may be seen at intervals, but it is soon hid by the covering of later materials, and is lost to view before the head of the open creek is reached. Beneath Fort Washington, and at various intervals along the cliffs of this side of Piscataway Creek, the Black Lower marl stratum is about fifteen feet thick, and is hardened at base, or changed into a thin broken layer of ironstone. The lower part of the stratum also abounds in crystals of Selenite, and affords casts of many kinds of shells in a soft state, coated with a brown film of oxide of iron. The black stratum grades into the more loamy greensand, which rises to an altitude of more than eighty

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feet above the level of the creek. No recognisable fossils were taken from this upper division, although indications of their presence were observed at occasional intervals. This greenish marl extends upwards into a more ferruginous sand, which is only the iron-stained and water-washed portions of its own body, from which the clay has been removed and the iron stained into the grains of sand. This upper part also joins a coarser sand of a more decided red color, of variable thickness, which extends upwards into the more gravelly sand of the Quaternary superficial stratum. On top of this last, boulders of Potsdam sandstone, quartz, diorite, and many other kinds of rock rest, often in a thick deposit of gravel and coarse pebbles. This material, varied with wide intervals of more or less gravelly yellowish loam, spreads back from this section, and forms a large part of the surface for a distance of several miles.

In that part of the section which lies nearest to the Potomac river, the lower parts are much obscured by fallen debris and clay from its higher portions, and by the dense growth of bushes, vines and trees which covers all but the steepest slopes. However, by clearing off the surface and digging through the thinner parts of the fallen material, we reach precisely the same beds as those enumerated before.

Directly beneath the fort we perceive a body of material which does not again appear until we have proceeded at least half a mile farther up the Piscataway. That is the presence of Eocene oyster and other broken shells spread over the steep incline for fifty feet or more, at an elevation of thirty to forty feet above the water. Upon close examination, however, the fossil shells are found to be a part of the Eocene mixture which was thrown down the hill, most likely at the time when the excavation for the fort was made. No Eocene appears in place directly in the composition of this hill, although scattered fossils have been picked up at various times on the surface of the gullies adjoining the fort.

The second bare exposure of the Cretaceous in the continuation of this hill appears at a distance of about three-quarters of a mile behind the fort. This is a much longer bold cliff than the former, and is cut back into a cove, which gives an extensive

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view of the beds along both dip and strike. The exposure here is more sandy above than in the preceding one, and differs from it in having a drift of quartz pebbles at base. Towards the east this stratum of pebbles is close, only a few inches thick, but it widens westward, and is continued by having the pebbles shot wide apart until it terminates a few rods down the creek. The Black Marl is here just the same, and of about the same thickness as in the other exposure, but it is much richer in casts of fossil shells, and these occur without the least regularity in nearly all parts of the bed. Above this rests the clay-like greensand marl, as before, which soon becomes ferruginated above, loses its glauconite, and assumes a looser and more sandy character. Over this rests the red sand, and on top of all is a Quaternary yellowish sand and loam, with less gravel than farther west.

One stage farther back, at a higher level, vestiges of the Eocene shell-marl appear in a deep cut of the surface, but no considerable bed of that material is seen in place. But at a distance of about one-eighth of a mile from the second bare cliff, up the Piscataway, a very extensive exposure of the Eocene shell-marl forms a bold boundary of the inner side of a wide cove which has been eroded from the continuation of the Fort Washington ridge. This series of fossiliferous beds rests apparently at a level of about fifty feet above the water of the creek, but its exact base cannot be explored because of the thick body of fallen material by which it is covered. This exposure will be more fully described in connection with the Eocene formation.

On the eastern side of this wide cove the black plastic clay of the Lower Marl bed makes an appearance from a few feet above water level, but at a distance of more than fifty feet from the low bank of the Piscataway. As before, the low terrace is composed of the downthrow of materials from the adjoining hills, but here it is chiefly built of soft and fine materials which have been spread out by the activities of a tributary brook. This alluvial material rests directly upon a shallow exposure of the Baltimorean variegated clay, and takes the position which formerly must have been occupied by the Albirupean and Cretaceous strata as they appear in the sections

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lower down the creek. Proceeding up the small branch which rises about a half mile back in the body of the high ridge, we see a high knob of Cretaceous black marl, of very dense texture, and almost as tough as cheese. This rises to a height of about thirty feet above the bed of the stream, and at its outer end is covered only by a thin deposit of such soil as has been washed down from the higher part of the adjoining hill. But few fossil shells have been extracted from this exposure, and they have been hardly recognisable casts of *Cyprimeria*, *Cucullaea vulgaris*, and a few forms just like others that were extracted from the cliff lower down the creek, near Fort Washington. From this bed, however, large numbers of coprolites, with some sharks' teeth and amber, have been excavated by freshets in the branch and carried down into the mud which lines the bottom and sides of the drain. The other outcrops of the black marl on this creek have thus far yielded nothing different from the preceding beds, and do not present any peculiar features. They are soon lost in the adjacent highlands, and cannot be reached except by deep excavation of the overlying surface.

As far as can be ascertained at the present time, the Cretaceous system of strata occupies an average width of about three miles on the Western Shore. The undoubtedly continuous beds vary somewhat in composition as they appear from one interval to another along the line of strike, and differences in materials may also be noticed in the ascending order of the beds. Thus, near the inner boundary of the formation, above Collington, the low dome-shaped beds are chiefly composed of coarse and mixed greensand which becomes unevenly carbonaceous beneath. Proceeding down the road to a short distance below Collington the formation appears thicker, and the higher hills expose below a bed of the more homogeneous black marl, overlaid by greensand of a somewhat loamy texture. Around Mullikin, on the same road, very fine-grained, homogeneous, brighter greensand makes up the dome-shaped hills, which are overlaid as usual by a covering of coarse silicious, ferruginous sand and fine gravel. The dense plastic black clay marl seems to be absent from this region, but it appears at the base of Mount Misery on the Severn; likewise around the head of South river, and again in

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the bluff about one mile above Fort Washington, on the Piscataway. The general uniformity of the materials constituting a stratum in each part of the territory shows how the same forces were at work in restricted localities. The finely reduced character of the particles of clay, sand, and mica in the plastic black marl strongly contrasts with the coarse sandy composition of the beds in the other localities, such as we see on Round Bay, and near Waterbury, in Anne Arundel county.

It seems likely that the upper member of these greensand marls has been to a large extent worked over by triturating waters so as to reduce it at length to extreme fineness of particles. If original sedimentation alone had been the factor in composing these beds, it is difficult to see how such uniformity should prevail throughout so much of their area. Laid down as these beds are, not simply in holes at the bottom of a deep ocean, but spread over the slope of a coast whose border was partly indented by estuaries, we should expect to find a sorting of the materials from the coarsest to the finest progressively in the direction of the open ocean. Such, however, does not prove to be the case, and we are accordingly driven to the conclusion that an almost landlocked oceanic tract existed, partly over and partly outside of the Albirupean coast, into which the wash of the adjacent land and precipitation of the dead bodies of minute animals was continuously going on through a long period of time. The lower member of this series must have derived most of its material from the Albirupean forests, meadows, and sand-hills; while the upper strata might have been taken from the clays at a higher level, and therefore farther inland, and ground up with the sands from the adjoining hills, while the bodies and shells of the animalculae were being steadily incorporated with the accumulating mud. The top of the lower, or black, member was denuded and eroded before the superincumbent strata were laid down, and it now seems quite probable that the middle and upper members of the series were not always deposited, since they are absent from many parts of the territory, and because there is no evidence of closely following denudation having taken place in these localities.

The great Clay Marl member, which forms such an extensive

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area in New Jersey, is now but meagerly represented in the Cretaceous formation of the Western Shore. Whether it once occupied a wide tract of country across the middle of Anne Arundel and Prince George's counties it seems now impossible to discover, but eroded remnants of it may be found in the highlands between the head of the estuary of the Magothy river and Round Bay, and again in the high hills above Indian Landing, northeast of Severn Run. Patches of this same marly clay appear at intervals across Anne Arundel county, and pass through Prince George's county on a sinuous line about two miles southeast of the Baltimore and Potomac railroad. But, as the western hills of debris are approached, before reaching the head of Eastern Branch of the Potomac river, these last remnants of the greensand marl are set farther away in the country towards the south, and finally disappear as the white and red clays become conspicuous.

EOCENE.—After all of the Cretaceous strata had been laid down and consolidated, the ocean again covered the land, apparently some distance further inland than its predecessor. But before much of the Eocene was deposited, the surface of the Cretaceous was deeply excavated, so that round-topped hills were built near the inner border of that formation, and tortuous channels led out towards the more open ocean. Greensand grains must still have been precipitated to the bottom of the water, since the greater part of the Eocene formation which immediately followed was to a great degree composed of glauconitic material. Doubtless some of the greensand was derived from the excavation of the Cretaceous marl resting on the shores and floor of the ocean; but as most of this material remains unaltered in the well preserved Eocene marls, it appears evident that it was derived from a fresh source of supply. The wear and tear of an eroding ocean now opened the way for the deposit of the Eocene beds, and these were laid down continuously over a large part of the Cretaceous, extending now over its hilly bottom, and then throughout the intervening channels and hollows. A series of thick beds of black micaceous marl, greensand marls, grayish marls, greenish sandy micaceous marls, marly loam, ferruginous sandy loam, aluminous fine whitish

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sand, diatomaceous sand, and finally white plastic clay parted by thin layers of yellow sandy clay, made up the chief part of this division of the Cenozoic column.

It does not seem likely that all of this series of strata formed a superincumbent succession. In one place, as, for example, the high cliffs near the mouth of Port Tobacco Creek, the acclivity shows the blue-black marl at the base, rising thirty feet or more out of the water, covered by a variable number of feet of whitish sandy clay, becoming finer above, and grading upwards into a bed of diatomaceous earth, varying from ten to forty feet in thickness. The western side of the continuation of this combination, as it becomes exposed in the lower cliffs on the Potomac river, above Smith's Point, presents a quite different body of materials. It is there made up of highly fossiliferous black plastic marl at base, from three to ten feet thick, overlaid by paler, or more ferruginous somewhat sandy, less fossiliferous marl, of variable thickness, which has been denuded on its surface. Here not a vestige of the whitish sandy clay or of the diatomaceous sand appears along any part of the section. At this point a more distinct stratification is visible in the lower bed, which also rises out of the water, and is not of the loose texture seen on Port Tobacco Creek, but is very dense and indurated. In this, too, we find incalculable numbers of fossil shells, arranged in drifts or colonies. The lowest series, at and below water line, being composed of friable shells of *Dosiniopsis meekii* and *D. lenticularis*, with a mixture of *Turritella mortoni* and a few small *Ostreas*. The next drift above this is composed chiefly of *Crassatella capricranium*, forming a series nearly two feet thick, and enclosing a few specimens of the *Dosiniopsis* and *Turritella*, with now and then an *Ostrea*. Above this, and continuing up to near the surface, small specimens of the narrow variety of *Ostrea compressirostra* form the chief contents of the remainder of the bed. Here the strata thin out rapidly, so that by the time that Smith's Point is reached the beds have descended to below the water level and become lost to view. As we proceed up the Potomac river these beds gradually rise into higher cliffs, which on and above the Mattawoman Creek reach a development only second to those which stand in monumental prominence near the shores of Piscataway Creek.

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On the same river, near Glymont, the dark micaceous compact blackish marl forms the base and rises into the abrupt cliff, overlaid by the greensand loam which becomes more sandy and ferruginous above. This section affords numerous and fine specimens of *Turritella mortoni*, with occasional single valves of *Ostrea compressirostra* and well preserved *Dosiniopsis meekii* and *Crassatella capricranium*. In this section the shells are deposited in groups of a single species in a spot, a few together in one place, as if the animals had been caught by the overwhelming sand and buried at the place of their abode. But few species have been obtained from this locality, but the specimens are usually found in well preserved condition.

As the black indurated marl is exposed farther east than this region, no specimens of the large *Latiarca gigantea* have been taken from the Glymont beds. Accordingly the *Latiarca* marl must be looked for at a distance of about two miles back from the Potomac river, where it occupies a diagonally directed ridge extending from Tinker's Creek to the north shore of Mattawoman Creek. No evidence of the presence of this large fossil shell south of this side of the Mattawoman has yet been procured, but it abounds where it occurs. It is well known to the people who reside in its vicinity, and they designate it in common speech as the "Turtle head." It seems to be confined to that part of the lower Eocene marl which displays its greatest thickness in a tract beginning about a mile east of the Potomac, extending across a width of less than two miles back on the Piscataway, and striking all the way down in a nearly southerly direction, through the Mattawoman swamp, to the bend of that creek, where it becomes narrow or has been mostly eroded away.

West and northwest of this region, on Pomonkey Neck, we search in vain for traces of the Eocene formation, or its underlying Cretaceous marls. But, a mile or more back from the Potomac river, we enter deep ravines in the highlands, and there once more the black Eocene marl, overlying the loamy greensand of the Cretaceous, appears in large deposits, supporting the mixed and silicified shell-limestone which rises to the summit of the less elevated hills. Here a wonderful spectacle meets the observer, in the bold cliffs which stand before and on

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the right hand, and where the fossil shells in countless numbers project from the marl as far as the sight can reach. In these deep gashes, cut in the side of a highland which rises more than a hundred feet above the river terrace, we have striking examples of the course selected by the streams in working their way out to the river or creek. Besides, showing how torrents of rain cut back into the adjoining bold hills, make lateral gullies, and establish a complex system of drainage which is ever modifying the arrangement of the contours of surface.

From the vicinity of the river we pass over the almost flat slope of the Quaternary river-terrace, until a point is reached along the bed of a brook, the stream of which is usually not more than five or six feet in width, where the hills begin to rise with a gentle grade. At this part of the mouth of the stream, a marshy spot usually spreads widely around into the underlying clay. Entering between the low ends of the hills, we find that the stream has opened a flood-channel, perhaps fifty feet or more in width. Keeping farther in, the hill quickly rises, but is covered on either side by the sandy loam washed from the upper levels. Proceeding farther into the ravine, the high hills soon begin to tower on both sides; but only at intervals do we meet with a precipitous exposure of the beds. The most abrupt cutting of the walls has been on that side which inclines towards either the south or the east; but on this side of the ridge, the steep bank is on the more southerly border of the stream. On this side the Eocene compact black marl forms the base of the exposures, and these are separated by a wide interval of mixed greensand and loam. These black marls are in part almost as dense and plastic as those of the Cretaceous, and are far more closely packed with several species of fossil shells. The bed first reached in a ravine running out from a point nearly northeast, next the boundary between Prince George's and Charles counties, shows an abrupt cliff, rising at that point about thirty feet above the bed of the stream, but connected with a higher hill farther back. Here *Crassatella capricranium* is densely packed in the lower portion, followed next above by *Dosiniopsis meekii*, an occasional specimen of small *Ostrea compressirostra*, and a few *Turritella*

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mortoni. This same character of marl keeps on up towards the head of the ravine as far as the stream, and its lateral branches have cut deeply into the body of the ridge. Here, as in all the rest of this section of country, the overlying loamy marl is covered up towards the surface with the Quaternary ferruginous sand, more or less gravelly, or with a pale yellowish sandy clay of somewhat uniform texture.

On the opposite side of the stream, but beginning at a much lower level, perhaps half a mile nearer the entrance, rounded and much broken hills appear, carved out of the bordering highland. These hills are moderately steep, sloping at an angle of from about 50° to 60°, and are separated at irregular intervals by eroded gullies. They rise at first forty to fifty feet above the stream, and farther back are merged into the body of the ridge. Rains and other atmospheric agencies have been cutting into the surface of these elevations, so that the outlying members have been greatly reduced in height, the sides have been sloped off, and the more abrupt projections have been overthrown and precipitated into the flood-bed of the stream. Rapid waters have poured against the sides of the gullies, enlarged their openings, washed the loose debris down to lower levels, and coming in contact with fallen marl, sand, fossils, and earthy mixtures, have made a wide, deep lining along the margin of the stream, extending into its bayed-out openings on the right bank. This section of the ravine is chiefly made up of a mixture of fossil shells, greensand marl, quartz-sand, and loamy clay thrown together in a confused manner, and composing the greater part of hills which rise sixty feet or more above the level of the stream.

As the base of these exposures is always hidden by fallen debris, sometimes to a thickness of ten feet, it is not always possible to examine the materials of which they are composed. But beginning at a level of about fifty feet above the river, these fossiliferous mixed beds come into view, while the black beds of the opposite side rise out of the bottom of the branch at a little higher level. In these mixed beds the fossils are densely aggregated into more or less silicified masses or layers, and they afford a much larger number of species than the black marls which occur farther back in the ridge.

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It seems quite likely that this body of intervening mixed material is not in its original order of deposition. The *Latiarca gigantea*, which elsewhere occupies the lower twenty feet of the black marl, here may be found buried in a pile of broken shelly matter, at various altitudes, reaching up to fifty feet above the bed of the branch.

This example will serve as a type of the ravines which are found on the beds of the various deep-cutting brooks that cross Pomonkey Neck, or enter the Piscataway west of the village of Old Farmington. These enormous deposits of fossil shells belong to the region lying west of a north-northeast by south-southwest meridian passing near the middle of Prince George's and Charles counties. East of the Patuxent river the Eocene fossiliferous strata take on a different *facies*, are subdivided into several members, and lack, with perhaps only two or three small exceptions, the compact black marls which are so immensely developed near the Potomac river.

No sharply defined vertical limits can be given for the species or genera of the fossil shells in the strata recorded above. In the black marl, which seems to be the fossiliferous member most distinctly in place, the *Ostrea compressirostra* occupies the lowest position, and it occurs in company with *Latiarca gigantea* up to twenty feet above the base of this bed. Above this level, and sometimes scattered below it, *Crassatella protexta*, *C. alaeformis*, and *Dosiniopsis meekii* appear in their greatest abundance, the *Dosiniopsis* coming in more particularly above the others and extending up to a height of about twenty-five to thirty feet above the base. Above this stage occurs *Turritella mortoni*, accompanied by a few small specimens of *Ostrea compressirostra*, and an occasional individual of the *Dosiniopsis*, *Glycimeris elongata*, *Cardita planicosta*, *Latiarca idonea*, and *Latiarca ononchela*. The *Turritellas* sometimes form a bed by themselves, a foot or more in thickness, with an interval of one or two feet before the next overlying stratum of fossils comes into view. The uppermost stratum is usually composed of more or less packed specimens of the same *Ostrea*, which often make a collection from two to five feet in thickness, and which appear on the surface wherever denudation has cut off the super-

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incumbent loam or sand. These elongated beds of fossils are not often continuous for very long distances in this region, and they do not always follow in the vertical order given above. Denudation or erosion has sometimes carried away one or more subdivisions of the series, and at other points it would seem that one or another of these large colonies of shells had failed to be present.

Returning to the great Eocene deposit on the Beard property, up the Piscataway Creek, about one mile from the Fort Washington wharf, we find a most remarkable example of the type of structure and composition of the formation, as it exists in the western part of Prince George's county. Here is observed a great deposit of marly sand and varied material, full of broken fossils mixed with the comminuted carbonate of lime derived from the vast numbers of shells which crowded the locality. This material is hard, but far less coherent than the corresponding bed in the vicinity of Upper Marlboro, and it readily shatters into irregular slabs and laminar chalky fragments by being struck with the hammer. The pieces as they are broken open disclose specimens of the *Crassatellas* with fragments of a chalky shell adhering, most of which drops off when they are removed from the matrix. Such is also the case with *Dosiniopsis* and *Turritella;* but individuals of *Glycimeris elongata* can be extracted with the shell almost entire, as may also be done occasionally with the shells of *Ostrea* and small specimens of *Turritella mortoni*. *Cardita planicosta*, of small size, also occurs in this bed, but it is never obtained with unbroken shell, and it is usually present as an indurated cast. This more or less indurated member of the section shows that the shells have been thrown together in heaps, in a most disorderly manner. The material has evidently been pushed into a widely eroded space between two high bodies of Cretaceous Black Lower Marl and fills up all the interval; while farther back it has risen to a higher level and spread westwardly, in a thin layer, over the top of the more loamy greensand marl which rests upon the Cretaceous Lower Black Marl.

The lower ten feet of this deposit is closely packed with friable shells of *Crassatella protexta*, another species, possibly *C.*

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alaeformis, and specimens of *Dosiniopsis meekii*. It does not form such a stony mass as that next above, nor is it as loose as we find beneath the silicified beds nearer the Patuxent river.

The entire exposure in this cliff appears to be about sixty feet thick, and its upper portion is continued in the loamy greensand marl which keeps on up to within fifteen feet of the coarse pebbly surface. The base of this cliff is deeply covered by material from above, which has been continuously washed out towards the channel of the Piscataway, adjoining which it forms a terrace overlying the Albirupean clay. This part of the formation lacks the basal black marl of the same period which holds the *Latiarca gigantea*. But it runs back to near the wide brook, about a quarter of a mile farther northeast, where the same fossils occur as have been recorded from the ravines near Old Farmington.

Passing up the bed of this brook, which runs next the high hill of Cretaceous black marl, on the eastern boundary of the wide cove, and following its moderately straight course for a distance of about one-third of a mile, the Eocene compact black marl makes its appearance on both sides of the ravine. Its base in the bed of the brook appears to be at a level of fully fifty feet above the water of the Piscataway. The banks here are abrupt cliffs, which are followed above by two or three stages of erosion to the summit of the hill, and form steep slopes as they ascend. Most of these acclivities are hidden by the deposition of surface material washed from above, but the slippery marl of the lower section forms an abrupt wall upon which nothing can lodge. At the bottom, however, trickling water keeps the border of the stream persistently wet, and makes a bed of mire two or three feet in depth. Several of these black marl banks present themselves in this vicinity, appearing most of the way up to the source of this brook and upon its lateral branches. In the lowest of these exposures, the *Latiarca gigantea* occurs from three or four feet above the bed of the stream up to about eighteen feet. The *Ostrea compressirostra*, *Dosiniopsis meekii*, *Crassatella protexta* and *Modiola* sp? also appear sparingly at or above this same horizon. Most of these shells, besides *Turritella mortoni*, are bedded in colonies, and excepting the

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Latiarca, sometimes form drifts of more than a foot in thickness, traceable throughout a distance of many feet.

Further up the Piscataway other ravines open, wherever streams cut their way down from the highlands. These correspond essentially with that just noticed and call for no further description. Along the banks of Tinker's Creek the same marls and fossils also occur. The shell-marl and loamy greensand of the Eocene keeps on continuously in the ravines of Piscataway Creek, and is discoverable in the banks of all the streams, and in the gullies back to Upper Marlboro; but the plastic black marl appears to be out of reach, or absent, after going beyond the head of that creek.

Passing to the north side of the Fort Washington promontory, on the shore of Swan Creek, three or four shallow ravines are observed to open out towards the water, but their banks are so deeply covered by sand and loam from above that the strata in place are hid from view. However, at the head of the estuary of this creek, a fine wide brook makes its way out to the broader stream and opens an avenue into the body of the hill. This active little rivulet rises high in the ridge, at a distance of more than half a mile inland, cuts its way deep into the strata, descends by stages, bends at two or three intervals, and rapidly increases its width after having passed about half way down the hill. The ravine cut by this stream has abrupt walls in the upper divisions, but these become much less steep as they descend, until near the mouth they slope at an angle of but little more than 45 degrees, and appear broken into separate rounded hills, by local erosion in the rain-channels. At the mouth, the ravine gapes widely, with reduced sloping sides, and it is choked by a low delta, formed of the clay, sand and loam frequently carried from above by overflows and freshets in the stream. Thus the original wide trough of the mouth is hid by the accumulation of earthy material which composes a sloping marsh extending out to the bed of the creek. The lower part of this ravine, up to about fifty feet above the level of Swan Creek, is composed of the Cretaceous Lower Marl, covered and hid almost entirely by loam and sand washed from the upper parts of the hill.

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Immediately above this, the compact black marl of the Eocene forms the steep walls of the ravine, and keeps on stage after stage until it terminates in the more loamy greensand-marl which rises to within five or six feet of the surface of the highland. At the first exposure above the Cretaceous, the Eocene black marl displays a thickness of about five feet above the bed of the stream, and holds specimens of *Ostrea compressirostra*, its top is then eroded, and we ascend a few feet before its continuation appears. It is now much thicker, and increases as it ascends, until the thickest part reaches to a height of about ten to twelve feet. This is the member in which the *Latiarca gigantea* is found, accompanied by the *Ostrea compressirostra*, and casts of *Dosiniopsis meekii*. Another stage has been cut above this, but there is after this no break in the continuity of the bed as it rises towards the summit. It is simply cut into uneven terraces by the aqueous forces which have eroded the brow of the ridge. From this point up, the fossil shells are arranged in separate horizontal layers, a few inches or feet in thickness. These consist of one series of remotely placed specimens of the *Dosiniopsis*, next a similar bed of the *Ostrea* followed above by a close deposit of *Turritella mortoni*, and this in turn by small specimens of the same *Ostrea* until near the top of the black marl bed. The few feet of greenish marl which rests above this, and finishes the Eocene at this locality, has hitherto yielded no fossils. It is of the type common above the shell-rock near Upper Marlboro and in many parts of Anne Arundel county, but it seems everywhere to be an almost barren member of the series of Eocene deposits.

This ravine is a typical one in most of its features, and it has the great advantage of displaying its exposures in undisturbed order. It has yielded fewer species of fossils than most of the other ravines in this section of country, but it is remarkably clean in most of its divisions, and exhibits the fossils in perfect form, although difficult to extract because of their friable condition.

The whole thickness of the deposit through this part of the ridge exceeds sixty feet, and it is here overlaid by the loam and gravel presumed to be of Quaternary origin. Several adjacent

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rain-troughs connect with the upper half of this ravine, and form a secondary and even ternary system of branches, in all of which the marl is exposed at a distance of five to ten feet below the surface of the country. No part of the mixed and broken marl-rock can be found on this side of the promontory, nor do we anywhere meet with the highly silicified shells which occur so abundantly in places along the tributaries of the Piscataway.

Directing our attention now to the region extending from Upper Marlboro to the village of Queen Anne and from thence up the Patuxent river to the vicinity of Governor's Bridge, we meet with the Eocene beds and strata connected with somewhat different physical conditions.

The thick bodies of plastic black marl holding friable fossil shells have disappeared, and in their stead we find beds and strata of greensand marl, generally more or less loamy in composition. The base of the hills near or below the level of the roads leading northeast is generally found to consist of this kind of greensand marl, and this directly overlies the stratum of silicious rock in which the fossil shells are densely packed. All the deep wells of the region have either penetrated to or through this rock-stratum, and in some places it has proved too hard and thick for the well-sinker to dig through. This fossiliferous stratum keeps on under the hills all the way up to the vicinity of Governor's Bridge, near which it becomes lost in the denuded uplands, and has not been seen beyond. It is also conspicuous in the bed of the Patuxent river, next the village of Queen Anne, and it is likewise found in the beds of the brooks at various points in that vicinity. Throughout all this section of country it is highly silicified, and holds the shells so firmly that it becomes very difficult to extract them entire.

The greensand marl which forms hills 30 to 50 feet high above the river near this village, are more largely composed of loose silicious sand than those a mile farther west, and the marl agrees in composition with that which forms the cliffs along the shore of Chesapeake bay, extending from the boundary of Bay Ridge to Thomas Point. The island, however, on which the old lighthouse here stands, forms an exception to the rest of the marl on this coast, since it is stained black with car-

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bonaceous matter, is charged with coarse sand, and becomes a tough, tenacious clay at base.

Several other varieties of marl, clay, and marly sand form thick strata in other parts of the Eocene territory of Anne Arundel county, but we cannot give place to them at this time. They are not characterized by fossils different from those of the other marl beds, and are of interest chiefly as complementary members of the great Eocene column.

It is of much interest to observe that on the outer boundary of this formation in Maryland there rests a thick stratum of pure white clay, in which no distinguishable fossils have yet been detected, that forms the transition to the Miocene formation next above it.

The Miocene, however, rather overlaps the outer boundary of this white clay at the upper end of Herring bay, and does not pass far over it in that section which appears above the water of Chesapeake bay, Parker's creek, and West river.

From the observations thus far recorded it is seen that the fossiliferous strata of our Eocene formation vary greatly in composition and contents, but that we fail to find decided parallelism between them and the strata which occur at Claiborne, Alabama. Identical species of fossil shells occur, it is true, at both localities, but the Maryland beds appear to belong chiefly to a lower horizon. Possibly the deep-laid strata, which here hold the gigantic specimens of *Ostrea compressirostra*, the large *Latiarca gigantea*, and the other species of this genus, will hereafter be discovered beneath the beds at Claiborne, if not in other parts of the South that have yielded so many interesting forms of fossil shells. We here append a list of all the genera and species of fossil mollusca which have thus far been recognized in the Eocene beds of the State of Maryland.

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LAMELLIBRANCHIATA.

1. Anomia Ruffini Con. Up. Marlboro.
2. Ostrea compressirostra Say. Ravines and hills of the formation generally.
3. O. divaricata Lea. Charles Co. south of Mattawoman.
4. O. sp? Near Glymont.
5. O. sp? Near Smith's Point, Charles Co.
6. Gryphostrea eversa Con. Up. Marlboro and Farmington.
7. Pecten sp? Piscataway.
8. Nuculana improcera Con. Up. Marlboro, Chase's creek, Piscataway.
9. N. parva Rog. Cliffs of Severn river.
10. N. protexta Con. Severn below Round Bay.
11. Yoldia sp? Piscataway.
12. Axinaea idonea Con. South river, and Annap. and Wash. R. R. near Annapolis.
13. A. staminea Con. Up. Marlboro, Queen Anne village, around Annapolis, etc.
14. Byssoarca sp? Piscataway.
15. Latiarca gigantea Con. Piscataway to Mattawoman.
16. L. idonea Con. Piscataway, Up. Marlboro, Queen Anne.
17. L. ononchela Rog. Piscataway.
18. L. transversa Rog. Up. Marlboro and Annapolis.
19. Limopsis sp? Piscataway.
20. Mytilus sp? Piscataway, Queen Anne, etc.
21. Crassatella alta Con. South river, Up. Marlboro, etc.
22. C. alaeformis Con. Piscataway, Up. Marlboro, Queen Anne, etc.
23. C. protexta Con. with *var. capricranium* and *var. palmula*. Piscataway to southern part of Charles county, etc.
24. Cardita sp? Near Annapolis.
25. Venericardia perantiqua Con. Piscataway.
26. V. planicosta Lam. Generally distributed.
27. Protocardia virginiana Con. Piscataway.
28. Dosiniopsis Meekii Con. Generally distributed.
29. Dione ovata Rogers. South of Round Bay, etc.
30. Corbula oniscus Con. Piscataway.
31. Corbula sp? Queen Anne.
32. Periploma claibornensis Lea. Piscataway.
33. Pholadomya Marylandica Con. Piscataway, Up. Marlboro, Queen Anne.
34. Glycimeris elongata Con. Piscataway, Up. Marlboro, Queen Anne, Annapolis, etc.
35. Pholas petrosa Con. Up. Marlboro, Piscataway.

GASTEROPODA.

36. Monodonta glandula Con. Annapolis, Up. Marlboro, Piscataway.
37. Turritella Mortoni Con. Generally distributed.

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38. T. humerosa Con. Generally distributed.
39. T. sp? Queen Anne.
40. Architectonica sp? Piscataway.
41. Natica interna Say. Piscataway.
42. N. sp? Piscataway, etc.
43. Lunatia eminula Con. Piscataway.
44. Infundibulum? sp? Near Annapolis.
45. Volutilithes sp? Piscataway.
46. V. sp? Queen Anne.
47. Athleta Tuomeyi? Con. Piscataway.
48. Triton Mississippiensis Con. Piscataway.
49. T. sp? Piscataway.
50. Fusus sp? Piscataway.

With reference to preceding observations, and regarding the levels at which the Eocene fossils occur, it becomes evident that these fossil remains have not always been deposited in the same manner. It has already been noticed how in the strata of black marl the species of shells rest in elongated horizontal drifts or colonies, often composed of a single kind, while in the various types of greensand marls and marly sands they are thrown together in confused piles, or distributed in thin sheets at irregular intervals. It is, however, satisfactorily clear that in most cases the beds and their contents still occupy the places in which they were originally laid down. This may be said especially of the black compact marl strata which extend all the way from Tinker's Creek, in Prince George's county, to Smith's Point, on the Potomac side of Charles county. Farther inland, on the shores of Port Tobacco Creek, and down the Potomac to near Ludlow's Ferry, the high bluffs of black marl are more sandy, and the component materials, being more acrid, have eaten away the shells from the fossils and reduced them to mere friable casts, coated with a stain of iron-rust.

But right alongside of the black marls in Prince George's county, the thick deposits of calcareous and siliceo-calcareous materials, charged with greensand and comminuted shells, form a heterogeneous mixture, which holds strata of silicious rock packed with fossils. Proceeding eastward, these beds grow thinner, and become deep-seated in the body of the hills. So that by the time Upper Marlboro is reached, the mixed material, composed in great part of fragmentary calcareous shells, has

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decreased to a thickness of less than ten feet, and rests at a level of about ten to fifteen feet above the bed of the creeks.

Exactly how far eastward the thick body of mixed fossiliferous matter extends, we have at present no means of knowing. Nor can we trace it southward for a great distance beyond the boundary line of Charles county, in the country adjoining Pomonkey Neck. As far as at present known, it runs from the middle of the promontory reaching back from Fort Washington, is entirely cleared away by the erosion of Piscataway Creek, and south of that stream passes into the high hills which are cut by the brooks near Farmington; while farther on it appears exposed in the ravines and gullies adjacent to the boundary of Charles county. It occupies intervals of a wide tract in this region, but it no longer forms such thick deposits after the head of the Piscataway estuary is reached. Possibly we may state, with near approach to accuracy, that it occupies a large part of an area which stretches about six miles from north to south by five miles from west to east. This is the region which has thus far furnished the largest proportion of fossil shells to collectors, and here it is that the greatest number of yet unreported species will reward the careful efforts of patient explorers. Already about fifty species of fossil shells have been procured from the numerous ravines of this tract of country; and a few of these appear to belong to horizons hitherto regarded as lying far above the Claiborne inferior level to which most of the fossils found here belong.

It seems unlikely, after viewing such vast deposits of fossil shells as those which confront the observer in this region, that the short list here given should enumerate more than a small proportion of the species buried in these huge mounds. Doubtless multitudes of other forms will yet reward the patient collector in these piles of oceanic debris, and this is made more evident by the many fragments of strange shells which are turned out there by every excavation of the deposit. The mixture of upper and lower Eocene species in these beds has yet to be accounted for; but as the upper Eocene forms have thus far been found embedded only in confused materials, it is possible that they were out of original position.

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It is interesting to notice how different has been the action of atmospheric agencies in modifying the condition of the fossils on the opposite sides of the Western [redacted]. In the region lying between the Potomac and Patuxent rivers the great proportion of these fossil shells has been scarcely affected by the iron solutions which stain the soils; while in the country extending from South river to the Magothy, only a very small number of the same species can be found otherwise than deeply penetrated by the iron brown solution, and reduced to a much more incoherent condition by its solvent tendency. While, however, the iron eats the shell completely away from the casts of fossils in many localities, in others it has the good quality of cementing the matrix of greensand marl which contains the shells, and by fastening all together in large masses, produces a rock-like body possessing great resistance to atmospheric and corrasive agencies.

Another condition of the fossils is that in which they appear only as slightly coherent casts, covered and held in form by a coating of iron film. These soft bodies occur distributed sparsely throughout the black sandy marls of the cliffs and gullies on Port Tobacco Creek, while another variety rests in the clayey greensand marls which overlie the shell rock in the vicinity of Upper Marlboro, and in various parts of Anne Arundel county. These fossils have been reduced to their present condition by caustic and acid agents soaked through the soil in aqueous solutions. Accordingly no part of the shell is left remaining, and the fossil relics are obtainable only in the most tender condition.

A similar solidification also takes place in the remains of fossils which occur in drifts or layers in the whitish sandy loam overlying the black marl on Port Tobacco Creek. These, then, are the principal modifications observed in the shells which belong to the Eocene of the State of Maryland.

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Before closing this paper it seems desirable to add some further observations relative to the Eocene beds as they appear along the extremities of the formation on the Western Shore of Maryland.

On the northeastern side of Anne Arundel county we find the Eocene greensand and ferruginous marl-sand directly above the surface of the Cretaceous Lower Marl bed at its beginning in the neck of land bordering the first uplands of Chesapeake bay, at the mouth of the Patapsco river. These beds, in one or the other condition, keep on northwest in or on top of all the prominent hills to near the head of the estuary of the Magothy river. On the east side of that river the ferruginous or upper member is apparently confused with the mixed sands of the Albirupean formation before the head of Stony creek is reached; but on the opposite shore of the Magothy river, both members of the series keep on up the high peninsula to above Round Bay station. They appear in thick deposits over Mount Misery, while the upper member, holding the ferruginous sandstone and its characteristic fossils, extends in thin beds interruptedly to near Johnson's station, on the Annapolis Short-Line Railroad. With great labor and close inspection of the pieces of brown sandstone, it has been possible for me to discover here and there over the inner thinned-out border of the formation ferruginated fossils or their casts. In fact, a few specimens of like character have been picked up by my own efforts as far back as the high hill near the mouth of Curtis creek on its southern side. Only a very small number of specimens have thus been obtained, and it will appear upon close inspection that by far the greatest proportion of the sandstone of that section is entirely destitute of fossils. Such casts or impressions of the Eocene fossils, as for example *Dosiniopsis meekii*, *Turritella mortoni*, *Pectunculus stamineus*, *Ostrea compressirostra*, *Cardita planicosta*, and *Nuculana parva*, or *protexta*, have occurred in loose pieces of the sandstone mixed with the broken rock on the tops or sides of the hills, or were found in the chunks of similar rock scattered over the surface of fields. It is in the finer grained and more flaky or powdery rock that we may expect to find the fossil shells, and scarcely if at all in the coarse-grained and sandy masses which occur in the same localities.

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The brown powdery sand which cloaks the upper parts and sides of so many of the high hills, all the way across this wide belt from the Patapsco to the Severn, is usually indurated into sandrock, either on the surface or a short distance beneath it, and this material may often be traced with a distinctly graduated regularity down to the base below where it is composed of the highly colored greensand.

It seems remarkable that the bluish-black, or true shell-marl of the Eocene, should fail to be present in this section of country. Small patches of the whiter and less ferruginated shell-rock, such as that seen beneath the green clay-marl of the country west of the Severn river, have been reported as occurring in the region near the mouth of the Magothy river; but no continuous stratum of this nature has yet been discovered in the uplands of these necks of land. Nevertheless, fossils of the iron-stained varieties abound, and the soil in some places, as we go towards the Severn river, is loaded with the fossil shells, or their casts and moulds. Denudation, after the deposition and uplift of the Eocene beds of this part of the country, has cleared off a thickness of many feet of surface which formerly rested above the strata containing the fossils. This removal of materials has also occurred over extensive tracts, now composing large fields, throughout which the shells may be seen either upon or only a little way beneath the surface of the soil. The proofs of this may frequently be observed in the adjoining hillsides, where the fossils rest covered up beneath many feet of the ferruginous marl.

In the city of Annapolis we find an interesting example of the way in which denudation has cleared away the surface from above the fossil shells. There, as on the opposite side of the Severn river, aqueous agencies have lowered some of the hills to a level of not more that 30 feet above the tide, and upon the very surface of the denuded level the fossil shells formerly rested in vast numbers. Even now, after so much of the area has been occupied by buildings, remnants of the old condition of things persist on the meadows which extend beyond the houses in the western part of the city. But as we proceed up the railroad, at occasional intervals the same kinds of fossils

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appear buried in the sandrock, and may often be found resting five or more feet below the surface of the ground.

At the other extremity of the formation, next the ridge of Baltimorean clays and sands which bar the approach of the lower Tertiary beds to the basin of the Potomac river, we observe the bluish or greenish-black marls, packed with the remains of Eocene shells. These beds enter from the southeast, pass across the head ravines of the western branches of the Patuxent river, and enter above the base of certain hills which are cut by tributaries of the head of Anacostia river. These hills may be recognized by their chocolate-brown color and softer, less coarse texture, than the similar ones which rise towards the Bowen and Wheeler roads, within and beyond the District of Columbia.

On the property of Mr. Robert W. Brooke the Eocene greenish-black marl, packed with broken shells, is exposed at the head of a tributary of the first large branch which crosses Central avenue about three-quarters of a mile east of the boundary of the District of Columbia. This outcrop of the shell-marl is fully two hundred feet long and from seven to twelve feet thick in the steep ravine of the brook. It ascends into the hill in the direction of the west, and the brown soil which overlies it rises nearly to the summit of the hill in which it occurs, and then reappears in the hills pursuing their course towards the residence of Mr. Brooke. The hill on which this house is situated is composed also in great part of the same chocolate-brown loam, and at a depth of twenty feet below the surface there, only a few feet from the house, the same shell-marl was met with in excavating for the well and found to have a thickness of five feet. This is an exceedingly fat and almost indurated shell-marl, which being so full of broken shells is in fine condition to be employed as an agricultural fertilizer. As the ravines of the next brook towards the west display no continuation of the chocolate-brown loam, and as they cut down into the blue or reddish clays of the underlying Baltimorean formation, we fail to find other exposures of the Eocene shell-marl in that direction. Proceeding in the opposite direction, however, about one mile towards the southeast, we again encounter exposures of the same shell-marl on the head branches

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of the long tributary of Beaver Dam Branch. The same features likewise recur in the hills opened by other tributaries of this same branch, about one mile north of Central avenue. At Seat Pleasant Post Office, about half a mile west of this larger territory of Beaver Dam Branch, the shell-marl has been reached at a depth of sixteen feet from the surface, in a well dug at the summit of the hill. After leaving this section the shell-marl of this same type occurs in ravines of nearly all the branches emptying into the West Branch of the Patuxent, and continues on beyond Upper Marlboro. The fossil shells taken from these exposures of the marl, as far as it has been examined for them, are *Turritella mortoni*, *T. humerosa*, *Ostrea compressirostra*, *Dosiniopsis meekii*, *Nuculana protexa*, and *Crassatella capricranium*. Fragments of shells are densely packed in many parts of these marls, and no doubt a close examination would reveal many more species than the six enumerated above. The material corresponds very closely with that which holds *Latiarca gigantea*, and *Cardita planicosta* in the region of Piscataway creek, but the marl in the vicinity of the District of Columbia has thus far failed to yield either of those species.

The upper, or ferruginous, stratum of the Eocene appears to have but a very restricted exposure in this part of the country. Fragments of the iron-brown sandrock containing casts of the Eocene shells have been picked up on the surface or in the ferruginous soil of the hills south of the District of Columbia. It is only, however, after we have passed to a distance of about three miles from the above named line that the superficial shell-rock forms a distinct layer in place. The best locality for this exposure known to me is that directly at the eastern end of Central avenue, on Dr. Berry's farm, where, at a level of six or more feet above the road, the rock forms a broken stratum about one foot in thickness. It crops out along the brow of a low hill there, is moderately ferruginated, and is densely packed with casts, and less frequently with the tests, of the shells. In this stratum, as indeed in places detached from it, the *Cardita planicosta* is accompanied by both species of *Turritella*, *Ostrea compressirostra*, and an assortment of the other well-known shells.

Several sections are available for illustrating these observations, but there is not space for them at this time.

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OBSERVATIONS ON NORTH AMERICAN CAPSIDAE, WITH DESCRIPTIONS OF NEW SPECIES. No. 5.*

By P. R. UHLER.

Fam. CAPSIDAE.

CYLLECORARIA.

Ectopiocerus. New gen.

Body spindle-shaped, wider than in *Teleorhinus*. Head wedge-shaped, arched at base, nearly vertical; eyes prominent, long-oval, in contact with the angle of the pronotum in both sexes; vertex long, convex, in front of the eyes as wide as the tip of pronotum; tylus long, narrow, tapering to an almost acute tip, jugum long wedge-shaped, abruptly tapering to a very slender tip, gena long, narrow, regularly wedge-shaped; rostrum slender, reaching between the anterior and middle coxae, the basal joint abruptly expanded and reaching only a little behind the middle of the gula; antennae long, slender, filiform, longer than the combined length of the pronotum, corium and cuneus, basal joint reaching beyond the tip of the head, shorter than either of the other joints, second longest; about equal to the third and fourth united, but as thick as the basal joint, and fusiform-incrassated at tip, third a little thicker and shorter than the fourth. Pronotum a truncated sub-cone, flattened anteriorly, arched posteriorly, the callosities almost obsolete, with the intervening surface twice indented, anterior margin with a narrow collum, lateral margins a little sinuated, the edge rounded off, not reflexed, with the anterior and posterior angles sharp edged. Scutellum a little longer than wide, tumid and exposed at base. Corium gradually widened behind, and becoming more convex next the cuneus, the costal margin hardly curved, but with the edge slenderly recurved, except at base, where it becomes wider; cuneus triangular, a little longer than wide, depressed exteriorly; posterior thighs flattened, long, a little recurved; basal joint of tarsi short, second longer, apical one much the longest.

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E. anthracinus. New sp.

Broad spindle-shaped, black, moderately polished, mostly bald. Head, including the eyes, much wider than front of pronotum, the vertex cylindrico-convex, indented each side behind, and with the posterior edge arched-carinate, the surface highly polished, smooth, excepting the base, with a yellow spot or streak each side next the eye; antennae testaceous, the clavate portion black, and the two apical joints more or less infuscated beyond the base; rostrum testaceous, the basal joint and apex piceous. Pronotum moderately smooth anteriorly, but closely, unevenly roughened and punctate from before the middle to base, and obsoletely punctate on the hollowed flanks. Scutellum obsoletely wrinkled on the sides and tip. Legs smooth, orange, with the tip of the tarsi piceous. Hemelytra shagreened, punctate on the clavus and inner area of the corium; membrane smoke brown, with the areole blunt spindle-shaped. Venter and pectus highly polished, not apparently punctate.

Length to end of venter, 6 millims. To tip of membrane, 7½ millims. Width of base of pronotum, 2 millims.

Several specimens of both sexes examined. Mr. James Behrens kindly sent to me a specimen from near San Francisco; Mr. Henry Edwards favored me with a male from Santa Clara, Calf., and a female from California was given to me by Mr. Henry T. Fernald.

This, the *Teleorhinus* and *Coquillettia* unite with *Orectoderus* to form a little assemblage of genera quite in contrast with the other forms of Cyllecoraria, and perhaps will eventually be linked with others to form a separate section.

Teleorhinus. New gen.

Broad fusiform, bald. Head sub-conical, sloping concurrently with and forming a gentle curve in conjunction with the pronotum, vertex almost flat, longer than wide, curved and arched at base, destitute of a neck behind the eyes; antennae inserted a little before and below the eyes, the first joint slender, shorter than the head, tapering towards the base, second joint very long, clavate from the middle to the tip, as long as the third and fourth joints united, the third and fourth filiform, of

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equal thickness, the fourth two-thirds as long as the third, acute at tip; eyes large, oval, placed obliquely, tylus narrow, sub-acute at tip, jugum long, a little swollen, curved, tapering, acute at tip, gena fusiform, set in an oblong cavity; rostrum long, slender, curved, reaching to the posterior coxae, the basal joint abruptly wide, compressed, about two-thirds as long as the head, the second joint reaching to the line of the anterior coxa, the third shorter, fourth a little longer than the third. Pronotum similar to a truncated cone, lateral margins hardly excurved, smooth, posterior margin straight, destitute of a collum, the callosities almost obsolete, with a double indentation between them. Scutellum longer than wide, almost flat, with an arched band across the base, and acuminate at tip. Posterior femora long, curved. Hemelytra convex posteriorly, gradually widening towards the membrane, with the costal margin sharp, curved; cuneus depressed, sub-ovate, acute at tip.

In *Teleorhinus* the cuneus is compressed against the side of the venter and rests at a very high angle, about 80°, to the plane of the tergum.

T. cyaneus. New sp.

Bald, steel blue, polished, burnished beneath. Head wedge-shaped, wider between the antennae than the apex of the thorax, highly polished; eyes brown, bounded on the inner side by an impressed line; base of vertex with an oval shallow impression each side, and a short, feebly impressed line on the middle, rostrum piceous, bucculae paler piceous; antennae slender, reaching behind the posterior coxae, black, minutely pubescent, the second joint testaceous or piceous on the basal half, and very thick, spindle-shaped on the apical half. Pronotum marked with remote, coarse, shallow punctures, the lateral margins rounded off, but reflexed next the anterior angles, and less so at the sub-acute humeral angles. Legs rufous or reddish orange, with series of obsolete punctures on the femora, the tibiae pale testaceous, infuscated at tip, tarsi blackish, basal joint very short, middle joint much the longest, apical joint much longer than the middle one. Scutellum smooth, highly polished, unpunctate, the base widely uncovered. Corium coarsely

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punctate, the clavus still more coarsely and roughly punctate in longitudinal lines; cuneus black, a little punctate; membrane piceous black. Venter highly polished, black, set with minute bristles on posterior margin of the segments.

Length to tip of venter, 5 millims. Width of base of pronotum, 1½ millims.

This insect closely resembles some of the black species in the genus *Prostemma* Lat. of the family *Nabidae*. Two females were examined from Los Angeles, collected by Mr. Coquillett.

Closterocoris. New genus.

Long, sub-elliptical, with the head expanded beyond the pronotum like a club or knob. Head sloping at angle of about 45 degrees, longer than wide, sub-conical as seen from above, a little contracted behind the eyes, but not carinated, vertex regularly widening anteriorly as far as the base of the antenna, raised along the middle and with a slender impressed longitudinal line reaching to the base; eyes ovate, prominent, placed obliquely, a little emarginated inwardly, next the anterior end, to receive the base of the antennae, tylus long, tapering towards the tip, not acute, grooved each side above the middle; jugum triangular, a little tumid, longer than wide, gena prominent, slender fusiform, bounded anteriorly by a carinate line; rostrum slender, curved, reaching to the posterior coxae, the basal joint as long as the gula, abruptly expanded in width; the second joint reaching the tip of the anterior coxae, third and fourth joints much shorter, nearly equal in length; antennae nearly as long as the entire body, filiform, the first joint longer than the head, tapering towards the base, second joint as long as the vertex and pronotum conjoined, the third hardly more than half as long as the second, the fourth more slender than the third and much shorter. Pronotum sub-campanuliform, with a broad flat collum next the anterior margin, posterior surface convex, with the margin arched and acute, sides sinuated, rounded off, destitute of a carina, pleural flaps sunken, the posterior angles sub-acute, raised; callosities obsolete. Scutellum a little longer than wide, convex behind the base, acuminate at tip, the base narrowly uncovered. Legs long, the posterior

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femora curved and compressed, basal joint of tarsi long and stout, the middle joint shortest, apical joint not quite as long as the basal one. Hemelytra almost parallel-sided, the costa wide and continuous, with the margin narrowly reflexed, very slightly curved; cuneus large, broad wedge-shaped, slightly curved; areole of membrane elongate subquadrate.

This genus seems to form a transition between the genera before mentioned and the subcylindrical *Cyllecoraria* represented by *Xenetus* and its most closely allied genera.

C. ornata. New sp.

Prevailing color yellow, or pale orange, opaque and minutely pubescent above, polished and shining beneath. Head almost bald, a little pubescent on the sides, piceous black, remotely coarsely, wrinkled and obsoletely punctate, the inner side of each eye bordered by a curved orange line; eyes brown; gula darker on the middle, yellow, or pale piceous each side; antennae pale piceous or yellow with piceous tips to the joints in pale specimens; rostrum pale piceous, darker upon the basal joint and tip of the fourth. Pronotum minutely transversely wrinkled and sparsely pubescent, orange yellow, margined with white, with the posterior sub-margin blackish, the lateral margin emarginated at the base of the hemelytra; legs orange, the femora becoming obscured towards the tip, the coxae and adjoining pieces white, tarsi and tip of tibiae more or less piceous, pectus highly polished, black piceous. Scutellum yellow, or orange, piceous black at base, bald. Hemelytra minutely grayish pubescent, the clavus smoke black, with a percurrent greenish white stripe on the middle, corium yellow, with a curved blackish stripe running along the middle to the tip and bending outwards next the base of the cuneus, costal suture embrowned, cuneus yellow, with a blackish tip; membrane fuliginous, or sometimes with a large pale spot on the middle, and a lateral yellow streak. Venter black, highly polished, with a large yellow or whitish spot on the middle at base, and sometimes with the marginal edge white.

Length to tip of venter, 7–8 millims. To tip of membrane, 8–8½ millims. Breadth of base of pronotum, 2–2½ millims.

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Some dozens of specimens of this pretty species have passed through my hands. It would seem to be quite common near the coast of California, and to extend pretty far south there. It occurs near San Francisco in the month of April. Messrs. James Behrens and Henry Edwards gave me specimens from that locality. Dr. J. L. LeConte sent to me specimens from Fort Tejon, and from the island of Santa Cruz. From Mr. Cassino I have received specimens collected near San Diego, and more recently a very dark variety of this species has been sent to me from Los Angeles by Mr. D. W. Coquillett.

Coquillettia. New genus.

This genus is signalized by an extreme development of the wings and hemelytra, which are nearly four times as wide as the clavate end of the abdomen in the male, while the abdomen is scarcely more than half their length, and its middle segments are contracted to a mere peduncle. Upper surface opaque, minutely punctate. Head narrow and long, almost vertical, with the front of the vertex wider than the apex of the pronotum, the base contracted into a short neck, but destitute of a carina, eyes large, very prominent, oval, placed almost vertical, face very narrow below the eyes, acutely subconical, the tylus tapering to an almost acute point, compressed on the sides, and bounded by a grooved short line next the base; jugum very short, elongate, tapering at tip, much shorter than the gena against which it rests, gena narrow fusiform, sulcated near the tip; rostrum stouter than in *Closterocoris*, reaching to near the middle coxae, the basal joint thick, reaching to about the middle line of the eye, the second joint extending to near the tip of the anterior coxa, the third shorter than the fourth, and the fourth acute, about two-thirds as long as the second. Pronotum short, campanuliform, contracted before the middle, and constricted behind the broad collum of the anterior margin, posterior lobe convex, anterior narrow, sub-cylindrical, the callosities prominent, bounded behind by a wide depression, the line between them a little carinate with a transverse indentation in front of it, humeral angles sub-acute, with the lateral edge feebly reflexed from that point a little way forwards, anterior

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to this the lateral margin is rounded off, posterior margin sinuated, leaving a broad area of the base of scutellum uncovered; scutellum wide, triangular, prominently elevated, with the basal area convex, and acutely margined each side, the posterior lobe separated from the former by a deep transverse depression, apex sub-acute; legs long and slender, the tarsi conspicuously long, with the basal joint very short, scarcely more than half the length of the second, the second very long, and the apical joint about two-thirds as long as the second. Hemelytra very long, the membrane (♂) almost as long as the corium and nearly twice as wide, the areole long and very wide, elliptical; costal margin nearly straight, narrow, feebly reflexed. Venter greatly contracted from behind the base to near the apex.

C. insignis. New sp.

Fuliginous, with the body piceous, above finely minutely pubescent, opaque. Head cinnabar red, not distinctly punctate, bald, infuscated behind the eyes, with an incised longitidual line on base of vertex, and a point next each eye, eyes brown, antennae pale rufo-piceous at base, fuscous throughout the other parts; rostrum more or less rufo-piceous, darker at base. Pronotum rufous anteriorly, and continuing upon the pleural areas and sternum, the posterior lobe fuliginous, minutely pubescent and sparsely obsoletely punctate. Meso- and meta-sternum rufo-piceous, highly polished. Legs rufous, including the coxae, with the tarsi and tip of the tibiae infuscated or piceous. Scutellum fuliginous on the basal lobe, rufous on the posterior division, the surface dull, almost bald, not distinctly punctate. Hemelytra thin, fuliginous or pale fuscous, dull, minutely pubescent, a long, somewhat triangular, pale yellow streak occupies nearly the basal half of the costa and extends back diagonally to near the tip next the clavus; the cuneus with a spot of the same color tapering along the apical margin of the corium; membrane very long and wide, bluntly rounded at tip, fuliginous, with a large whitish ragged spot as base, including the inner end of the areole; wings white. Abdomen blackish piceous, highly polished, fringed with minute bristles on the margins and sides of the segments.

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Length to tip of venter, 5–6 millims. To tip of membrane, 7–8½ millims. Width of base of pronotum, 1¼ millims. Length of corium, 3½–4 millims; of membrane, 3–3½ millims; breadth of the same, 1¾–2 millims.

This beautiful and remarkable insect has a wide distribution and is variable in depth of color and extent of wing covers. It has been taken on the plains in Dakota, Idaho, Colorado and Montana. I have examined a specimen from Santa Barbara, Cal., and two others have recently been sent to me from Los Angeles by Mr. Coquillett, to whom it gives me much pleasure to dedicate this genus. A variety has the corium yellowish white, with a large fuscous triangle at tip, the cuneus is also white, with a small fuscous tip, and the membrane fuscous throughout. Only males have been examined.

Xenetus Dist.

1. *X. regalis.* New sp.

Elongate, subcylindrical, black, opaque, with the posterior lobe of pronotum, pictus and lower part of head rufous. Head vertical, blunt, short, smooth, hardly polished, very slightly pubescent on the sides, vertex convex and with the longitudinal impressed line continued almost to the front; rostrum slender, reaching to near the middle coxae, pale piceous, black piceous on the basal joint; antennae long, filiform, smoke-brown, nearly as long as the entire body and membrane of the wing-covers conjoined, with the basal joint pale piceous, and the basal portion of the third joint whitish. Pronotum much longer than wide, the anterior lobe abruptly narrower than the base, cylindrical, black, slenderly and transversely wrinkled, posterior lobe more minutely wrinkled, convex, the posterior margin very slightly sinuated, with the humeral angles almost acute. Scutellum red at base, black on the transverse impression, and pale yellow on the apical lobe. Legs slender, rufo-piceous, or piceous, the tibiae sometimes paler, posterior femora moderately thick, feebly curved, a little compressed. Hemelytra dull black, minutely pubescent, with a white band at the base of the cuneus, the cuneus narrowly margined with whitish, and the costal margin nearly straight; membrane long, smoke brown. Abdomen dark, or black piceous, polished, narrow.

Feb. 5, 1890.

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Length to tip of venter, 6–6½ millims; to tip of membrane, 7–7½ millims. Width of base of pronotum, 1¾ millims.

Specimens have been collected for me in various parts of the United States. Mr. Ashmead has taken it in Florida. Dr. Melsheimer gave me a specimen from York County, Pa., where it lives on *Carya alba* during the latter part of May. I have seen a specimen from central Illinois, and I have taken a single specimen in the vicinity of Baltimore. Mr. Belfrage also captured a pair in the vicinity of Waco, Texas.

2. *X. scutellatus.* New sp.

Elongate, subcylindrical, deep black, dull above. Head vertical, blunt, short, moderately polished, face below the vertex brown piceous, vertex with a faintly impressed longitudinal line, eyes brown; antennae blackish piceous, the basal joint pale interiorly, incisures of all the joints pale, the base of the third joint whitish. Pronotum black, apparently bald, minutely transversely wrinkled, the anterior lobe contracted, cylindrical, the posterior lobe wide convex, with the humeral angles subacute. Pectus black, polished, with a pale piceous streak on the forward margin of the middle coxae. Legs dark piceous, paler at the joint of the tibiae, the posterior coxae white. Apical lobe of the scutellum ivory white, basal lobe black, minutely scabrous. Hemelytra black, minutely pubescent, with the costal margin nearly straight, and a narrow white band (sometimes absent) across the base of the cuneus; membrane black. Venter black, highly polished.

Length to tip of venter, 6–7 millims; to tip of membrane, 7–8 millims. Width of base of pronotum, 1½ millims.

A very common species in Illinois, and not uncommon in Massachusetts, New Hampshire, Connecticut and Ontario, Can. It has also been taken in Maryland, North Carolina and Virginia.

Rhinocapsus. New gen.

Oblong-ovate, highly polished; head moderately appressed, slanting forwards; vertex almost quadrangular, transverse, a little convex; the face abruptly contracted, with the tylus very

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prominent, long, arched, tapering at tip, and having the boundaries deeply incised; antennae stout, a little longer than the corium, inserted near the lower end of the eyes, the basal joint shorter than head, the second subfusiform, as long as the pronotum and vertex united, the third and fourth setaceous, abruptly slender, together much shorter than the second; eyes nearly vertical, prominent, ovate, in contact with the angle of the pronotum, rostrum very slender, reaching beyond the middle coxae, the basal joint wide, compressed, longer than the head; occiput with a blunt collum. Pronotum trapezoidal, wider than long, strongly curving down forwards and laterally, the lateral margins distinct, obliquely narrowing anteriorly, the anterior angles bluntly rounded, the anterior margin not quite as wide as the head and eyes, sinuated and thickened, basal margin a little concave. Anterior rim of the prosternum carinate, the flaps large, and prominently arched. Legs stout, the posterior femora long, broader and more compressed than the others, marked with rows of brown dots; tibiae very slender, armed with very feeble remote spines; basal joint of tarsi very short, the other two much longer, subequal. Scutellum short, almost flat, acuminate, widely uncovered at base. Hemelytra complete, costal margin regularly arcuated from base to the end of the cuneus, clavus narrow, the posterior portion acutely narrowing to the tip; the cuneus short, distinctly but not deeply incised, with the outer margin more distinctly arcuated. Venter polished.

Closely related to *Phylus limbatus* Fieb.

R. Van Duzeii. New sp.

Oblong-ovate, highly polished, diluted-rufous, or pale chestnut brown, with the head pronotum and pleural pieces pale rufous. Eyes, venter, membrane, apical two-thirds of the second joint of antennae, tylus and base of rostrum above nigropiceous. Head smooth, bald, having a very obsolete puncture on the face, vertex very moderately convex, depressed above the antennae next the eyes; front abruptly contracted, the tylus cylindrical, curved somewhat like the beak of a parrot, thick and very highly polished; antennae testaceous, the second joint

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dull blackish from near base to the tip, very stout and long, somewhat thickened towards the tip, the apical joints a little infuscated; rostrum pale testaceous, the basal joint more or less piceous. Pronotum very moderately convex, highly polished, punctures sparse and almost obliterated, the posterior angles prominent, followed next inwardly by a distinct sinus; boundaries of the feeble callosities well defined, the pair separated by a transverse indentation. Scutellum with a few wrinkles and obsolete punctures, next the base transversely impressed. Middle of mesosternum and generally the whole of the metasternum piceous like the venter. Legs pale testaceous, the posterior femora with two uneven rows of brown points, apex of tarsi, and sometimes tip of tibiae infuscated. Hemelytra highly polished, more or less embrowned, obsoletely punctate, more coarsely and distinctly punctate in the sutures.

Length to tip of abdomen, 3 millims; to tip of membrane, 3½ millims. Width of base of pronotum, 1 full millim.

By the kind courtesy of Mr. E. P. Van Duzee I have been permitted to study three good specimens of this pretty little Capsid, which were captured in July at Coldon, New York. It gives me pleasure to recognize his ardent zeal in bringing together so many good insects in this interesting group by giving his name to this pretty species. A red variety of this insect, but of smaller size, occurs in Maryland, Virginia, North Carolina, and Florida.

Myrmecoraria.

Mimoceps: New genus.

Nabiform, elongate subcylindrical, polished, head almost globose, wider than the fore part of thorax, somewhat conical in front owing to the prominence of the tylus; face almost vertical; eyes large, prominent, hemispherical, separated from the pronotum by a stricture of the occipital portion; antennae slender, almost setaceous, as long as or longer than the body, the second joint about three times as long as the basal one, the third only a little shorter than the second, basal joint greatly constricted at base; rostrum slender, reaching to near the

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middle coxae. Thorax campanulate, contracted next the head, and with a convex elevation behind the collum, posterior portion of the hind lobe depressed, with the posterior margin a little sinuated; legs long and slender, the posterior femora almost cylindrical, scarcely compressed. Hemelytra coriaceous throughout, either as long, or nearly as long as the abdomen in the undeveloped specimens, cuneus not defined, convexly embracing the venter, the apex bluntly rounded. Venter convex, wider behind, with the genital segment short and obtuse, venter narrower and more cylindrical in the male. Scutellum large, exposed at base, transversely impressed. Macropterous form having the membrane thick, long; the cuneus long, almost ligulate, curved on the outer margin towards the tip, the tip emarginated, cell very large and long, reaching nearly to the tip of the cuneus.

1. *M. insignis.* New sp.

Subcylindrical, broader and a little flatter behind, black, polished, not distinctly pubescent, legs and antennae fulvous, but with the basal joint of the latter yellow, but infuscated on its proximal end, and face impunctate, the tylus thick, prominent, convex. Rostrum fulvo-testaceous, tipped with black, the basal joint a little thicker than the following ones, shorter than the head, third joint much longer than either of the others. Pronotum with a wide, transversely striated depressed collum, behind this the surface is bilobately convex, and the convexity bounded behind by an impressed triangular line, the posterior lobe slightly convex, somewhat transversely striated near the more elevated humeral angles. Coxae and trochanters bright yellow, the tarsi and nails a little infuscated; anterior legs widely separated from the middle ones, the hind legs very long; basal joint of tarsi much stouter than and as long as the two others united. Hemelytra blackish with a large triangular yellow spot at base, and a pale exterior margin on the apical fourth.

Length to tip of abdomen, 5 millims. Width of base of pronotum, 1 millim.

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Only two specimens, both females, have been examined. The one from near Chicago, collected by Mr. Bolter, is macropterous and has the wing covers much longer than the body, with the membrane developed. The other from Mr. C. W. Stromberg, Galesburg, Ill., is brachopterous, but has the wing covers a little longer than the abdomen, and bluntly rounded.

2. *M. gracilis*. New sp.

Narrower than the preceding species, the thorax not wider behind than the swollen middle. Black, polished, apparently quite bald. Head almost spherical, the tylus moderately prominent, broad and convex, sharply defined; antennae very slender, longer than the body and wing covers in the brachopterous form, fulvo-testaceous, infuscated at tip, the fourth joint long, much longer than the basal one, but shorter than the third and equally slender, the second joint not as long as last two united, the basal joint stout, feebly curved, longer than the head, contracted and black at base; eyes prominent, dark brown; rostrum testaceous, piceous at base and tip, reaching to the middle coxae in the females. Thorax subcylindrical, with a depressed collum in front, followed behind by a swollen lobe, which causes the middle to be as wide as the more flat, almost rectangular base, the posterior margin a little curved upwards; legs long, fulvous, infuscated at tip of tarsi, the coxae and acetabulae pale yellow. Scutellum convex, dull black, acute at tip. Hemelytra coriaceous, shining black, with a long deep yellow spot at base which is continued, paler, narrowly along the costal margin to the tip, which is covered by a broad white spot. Abdomen black, highly polished, a little widened behind.

Length to end of abdomen, 4–4½ millims; width of pronotum, ¾ millim; width near apex of venter, 1¾ millims.

One specimen from Wisconsin, sent to me by Mr. Bolter, and a series of both sexes from Buffalo, N. Y., and Muskoka, Ont., kindly given to me by Mr. Van Duzee.

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ONCOTYLARIA.

Macrotylus Fieb.

1. *M. regalis.* New sp.

Elongate, moderately narrow, rather scabrous than punctate, piceous black, with the scutellum, wing-covers and posterior two-thirds of the prothorax carmine red. Surface, especially of the head, polished; anterior lobe of the pronotum together with the head coal black, lustrous. Head of medium length, obsoletely scratched and having a minute yellow point at base; face with erect hairs on the front and sides, antennae stout, piceous, blacker at base, clothed with grayish pubescence, paler at the incisures, second joint somewhat longer than the third, a little thickened from beyond the middle to the tip, third joint but little thinner than the second, fourth joint of nearly the same thickness as the third, and not quite half as long; rostrum pale piceous, darker at base, extending to behind the posterior coxae; bucculae pale. Pectoral surface black, highly polished; pronotum wrinkled, the two lobes well separated by an impressed transverse line, the anterior lobe narrow, short, black, a little pubescent on and about the margins, posterior lobe bright red, minutely pubescent, feebly wrinkled, depressed on the disk, and with an obsolete carina along the middle, the lateral margin a little sinuated and bluntly carinate, and with the lateral flaps red, polished, sunken, wrinkled, piceous anteriorly. Legs pale piceous, with the middle of the femora and more or less of the tibiae pale yellow. Scutellum well exposed, red, obsoletely wrinkled, tinged with piceous at base, with a small yellow spot near each basal angle, and with a feeble carinate line on the middle. Corium obsoletely scabrous, feebly pubescent, with the nervures strongly defined, the membrane pale brown, iridescent, having the apical portion of the nervure rufous. Abdomen thick, black, polished, margined with rufous at and near the tip.

Length to end of venter, 3¼ millims; to tip of membrane, 4 millims; width at base of pronotum, barely 2 millims. The antennae are about as long as the corium and membrane taken together.

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One specimen from Mr. Coquillett, captured near Los Angeles, is the only one that I have seen. This is, however, so distinct from all the others thus far recognized that I venture to depart from my usual practice with regard to describing species from a single specimen. The opportunity to examine specimens of the male is awaited with much expectancy.

2. *M. tristis.* New sp.

More elongated than the foregoing species; the color above is a dull pale blackish slate, minutely grayish pubescent, the underside and head shining black. Head long and narrow, polished, vertex convex, and together with the face bald, clothed with grayish pubescence on the clypeus and cheeks; antennae black, thick, long, the second joint evenly thick throughout, a little shorter than the two following conjoined, the third and fourth of about equal thickness, but the third fully twice as long as the fourth; rostrum slender, long, reaching to near the apex of the venter. Pronotum dull slate black, subcampanuliform, covered with grayish pubescence, the anterior lobe narrow, convex, separated from the posterior one by a deeply impressed line, the callosities jet black, polished, posterior margin sinuated, leaving the base of scutellum widely exposed. Legs long, dull piceous black. Scutellum moderately convex, minutely pubescent, with the basal portion marked off from the disk by a deeply impressed curved line, and near each basal angle is a minute yellowish spot. Corium moderately flat, not distinctly punctate, covered with minute grayish pubescence, the membrane fuliginous, somewhat iridescent, with the vein and basal and inner margins of the cuneus, particularly at tip, ivory-white.

Length to end of abdomen, 3½ millims; to tip of membrane, 4 millims; width of pronotum at base, 1 millim. This gloomy-looking species appears to be common in the southern part of California, but especially in the vicinity of Los Angeles. From this last named locality several specimens have been sent to me by Mr. D. W. Coquillett, who has done more than any other entomologist to disclose the peculiarities of the fauna of Southern California. This species bears a close resemblance to

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Macrotylus herrichi Reuter, of Central Europe. But it differs in having a more elongated head, with the pronotal callosities round, much elevated, and highly polished, while the head and thorax are proportionally longer, and the transverse yellow spots are absent from the pronotum.

3. *M. vestitus.* New sp.

Oblong-oval, pale green, invested above with white pubescence, which is more sparse upon the head, pronotum, and scutellum; beneath polished and shining. Head a little longer than wide, triangular above, greenish yellow, polished and bald beneath, the upper surface moderately convex, sparsely pubescent, the immediate base contracted, and this bounded before by a distinct carina; tylus long and wide. Eyes prominent, brown. Antennae long, slender, slightly longer than the corium and cuneus united, the second joint about as long as the clavus, the apical joints long and equally filiform. Rostrum greenish, piceous at tip, reaching upon the genital segment in the ♀. Pronotum greenish yellow anteriorly, deeper green at base, whitish pubescent, remotely punctate at base and about the anterior sutures, the callosities large, transverse. Scutellum feebly convex, yellowish, sparsely pubescent, set with a few black bristles. Legs long, greenish yellow, with tip of tibiae and both ends of tarsi piceous. Wing-covers obsoletely punctate, invested with whitish pubescence which is mixed exteriorly with some black setae.

Length to end of abdomen, 4½–5 millims; to tip of wing-covers, 5–5½ millims; width of pronotum, 1¼ millims.

Kindly sent to me by Mr. Coquillett, who captured the specimens near Los Angeles, California. Thus far only a few females have been sent to me for identification and study. It is of a broader form than either of the foregoing species, and is well characterized by its clear green color spread over with the white pubescence.

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OBSERVATIONS ON THE COPPERHEAD SNAKE, ANCISTRODON CONTORTRIX.

By HOWARD H. HOPKINS, M. D.

During several years past it has been a source of interest to me, amidst the duties of a profession which led me into various parts of a large district of Frederick County, to gather information relating to the venomous snakes of our Maryland territory. With an eager desire to acquire as many facts as possible concerning these remarkable creatures, I have enlisted the services of various friends and acquaintances to secure specimens of these reptiles for me, so that I might study them at leisure and learn some of the exact truths which remain unrecorded relative to their habits and structure. It has been my good fortune to examine and note some of the peculiarities of both the Rattlesnake and Copperhead, which are the only venomous snakes belonging to our State.

It is to the latter of these two, the Copperhead, that I wish at present to direct some attention, especially as no full life-history of these reptiles is as yet attainable.

From personal observation, I am induced to believe that the *Ancistrodon contortrix* is by no means so common as we have been led to suppose from the reports of persons who live in the sections of country where these creatures are known to exist, and the specimens sent me as Copperheads have, with few exceptions, proved to be the common hog-nose or blowing-viper, *Heterodon simus* Linn.

Distribution.—The Copperhead is known to be found from New England to Florida between the Atlantic Ocean and the Alleghany Mountains, and it is also distributed west to central Kansas and south to Louisiana. I have seen specimens at various places in Pennsylvania, Maryland, West Virginia, Virginia and North Carolina.

Prof. P. R. Uhler informs me that the Maryland Academy of Sciences has had specimens from the valley of the Potomac river above the chain bridge; also from the country adjoining Martinsburg and Harper's Ferry; likewise from the mica

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schist region below Parkton, and near White Hall, in Baltimore County. In this last named section the Copperhead is known to be common. It is most active during the night, and he has seen specimens lying on the track of the Northern Central railroad which had been cut in two pieces by the passing trains. It also lives among the broken shales on the summit of South Mountain, near Boonsboro, Md.

The species was formerly not rare on the head-waters of Gwynn's Falls, in the vicinity of Pikesville, and was there to be found in rocky places about the thin woods, distributed along the broken borders of the stream. It occurs also in the sandy and marshy, wooded low grounds of the Pocomoke flood basin, south of Snow Hill, in Worcester County, Md.

Habits.—In the summer season they lie concealed during the day beneath a heap of brush-wood, straw, a pile of fence rails, or stones in the fields or woods near their haunts, or, having crawled under a wheat-shock or hay-cock, are sometimes hauled with the wheat or hay into the barn. Occasionally an individual is found under a hog pen or even in the horse stable. It may be that they thus seek this shelter from the direct rays of the sun, as such places are generally cool and damp, or as likely, a cover for mice and insects, upon which these reptiles feed.

Toward evening they leave these retreats and move about with greater activity and are more alert than during the day.

I have never seen the Copperhead climb into bushes or trees, nor bask on warm rocks in sunny places, nor rest on the branch of a bush or tree overhanging the streams or ponds of water, as is the habit with the black snake, garter snake and water-moccasin.

A friend told me of a den in which he had counted seven Copperheads, and upon visiting the place I found but three specimens. The den was situated under the roots of a tree that had been overturned by the wind, and grew in a rocky piece of woodland.

Last August I visited Piscataway creek, back of Fort Washington, in company with Prof. P. R. Uhler, who was desirous of investigating certain geological formations at that point. Several abrupt bluffs along the river, as well as the deep

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ravines through sand, gravel and marl beds, rich in fossils, down to the underlying clay, afforded us ample opportunity for the required investigations. The day was oppressively warm, but our desire for investigation never lagged for want of interesting material, which presented itself at almost every step. I frequently inquired of our guide, an old colored man, if Copperhead snakes were not to be found in that locality, but he assured me he had never seen one, although he had lived there for more than twenty years.

We pushed our way along, single file, among the rank undergrowth by the river side, through an unfrequented hollow, where the dense foliage shut out effectually the midday and afternoon sun. The concealed character of the place, damp and cool, bathed by the mists caused by the rays of the rising sun, together with the cold nature of the clay soil there, evidently afforded suitable conditions for the cold, clammy nature of these reptiles. While moving forward at this place, our guide in front placed his hand upon a decumbent log over which we had to pass. I discovered within a few inches of his hand three beautiful Copperheads coiled together upon the log. My call to the old negro to be on his guard only had the effect of arousing two of the reptiles sufficiently to cause them to sluggishly raise their heads, followed by a relapse once more to rest. Their apparent sense of security, perhaps, arose from the unfrequented and unattractive nature of the hollow in which they lived; they showed no disposition to either attack or retreat.

The picture thus presented was beautiful, but, our time being limited, we were compelled to summarily bag them and move on. All three of these snakes proved to be females. From two of them we secured eight young each, and from the third one twelve young ones, making in all thirty-one Copperheads in a single locality where they were supposed not to exist. As they are often brought down the Potomac river on driftwood from points many miles above the place where we found these specimens, their presence might be thus accounted for, although I am inclined to believe they are to be found generally through that section of country.

Hibernation.—Upon the approach of winter, these snakes are

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not infrequently found under the straw-rick or manure-heap of a barnyard, and they are sometimes found in the barn.

I have never met with them in midwinter, but I imagine they hibernate in numbers or singly in some protected locality.

A gentleman told me he had killed thirty-seven Copperheads while removing the manure from his barnyard in the spring of the year; he found them all together, where they had evidently remained during the winter.

Form and structure.—Of eight specimens measured during the past summer, the lengths were as follows: 25½, 30, 31, 32½, 33½, 37½, and 40 inches, which would make an average of 32$\frac{6}{7}$ inches. The usual length, however, is less than 30 inches.

The distance from vent to the tip of the tail measured from 3¾ to 5 inches.

The greatest circumference of body proved to be from 3½ to 5 inches.

The proportions of the body are nearly stable, but some specimens appear a little more slender than others. The young individuals are less robust than the well grown.

The bones of the jaws and mouth are connected by ligaments which admit of great distention, and thus enable the reptile to swallow prey of considerable size and much thicker than itself.

The great mobility of these bones is also shown by the manner in which the serpent spreads its head when alarmed or about to strike. This increases the width of the head to almost double the size assumed when at rest, while the neck at this time is also much better defined.

As a means of locomotion, the ribs, which are very numerous, play an important part, being directed by the muscles to which they are attached. Ordinarily, the head and neck are but slightly raised while the snake is in motion, nor does the tail appear necessary to its movements, since I have observed a specimen to glide along with perfect ease after this appendage had been lost.

Being very sluggish in their movements, they do not show a disposition to attack or even to defend themselves if approached quietly, and they can even be taken up and handled without an offer of resistance. If, however, there is any sudden movement

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upon the part of the would-be captor, the animal instantly, through fear or excitement, makes an effort to strike or escape.

The Copperhead usually strikes from a coil if disturbed while at rest, but this coiled position is by no means necessary to that act, and it is rarely assumed if while in motion its progress is suddenly arrested. But in this case the head and neck are more or less raised and well drawn back, while the rest of the body is twice bent, somewhat like the letter S, and is thereby furnished with a support to strike from. The jaws are then also widely distended and the sharp points of the fangs brought well forward, presenting a picture that must be seen to be appreciated.

The act of striking is accomplished with surprising rapidity when compared with the usual slow movements of the snake, and the head is quickly returned and held in position ready for a second attack.

In the act of striking, the snake cannot propel the head more than one half the length of the body.

The poison glands are soft and spongy; they are placed under the strong temporal muscles, which, when compressed, force the poison out by means of a canal through the fangs.

In appearance the poison is a thin yellow fluid. Recent investigation by Dr. S. Weir Mitchell has discovered this albuminous compound to contain two poisons, which he has called "venom peptone" and "venom globulin."

The two poison fangs in front are attached to movable bones, and when at rest are laid flat, pointing backward upon either side of the roof of the mouth, and concealed in a sheath or fold of mucous membrane.

Owing to the mobility of the bones of the face, a capacity for *lateral* as well as forward motion is given to these fangs, a fact I have never before heard expressed or seen in print.

While not recognizing the possibility of this lateral motion, I barely escaped being bitten through the careless manner in which I handled a specimen of the snake.

The front or attached fang is supplied with a canal or groove, formed by bending the tooth as it were upon itself. Through this groove the poison is conducted from the base of

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the tooth to a small oblong opening or slit near the point of the fang, on its anterior convex surface.

It is said these poison fangs are shed by a process similar to that which takes place in the teeth of sharks; they are also liable to become broken or injured.

For the purpose of repairing such loss, a number of other fangs of varying size and less developed are found immediately behind the perfect front teeth. These smaller teeth are unattached, lying loosely inclosed in the same capsule or mucous fold and arranged according to size, the largest one placed first and ready to take the place of the perfect tooth in front should it from any cause be lost.

I have found from six to thirteen of these supplementary teeth on either side in such specimens as I have examined.

The length of the larger or perfect fangs averaged a little over $\frac{1}{4}$ of an inch.

Color.—The color varies from a nut brown to flesh tints, with darker oblique transverse bars on the back and sides, the head often being of a bright copper color, while from the vent to the tip of the tail the color is much darker than upon any other portion of the body.

The under surface is whitish or of a light slate color, with a row of dark spots or blotches either round, or of irregular shape and size, on each side, numbering from twenty-three to thirty-four in the row.

The general coloring appears to agree somewhat with the character and color of the ground upon which it occurs. Thus in some specimens the colors are beautifully bright and distinct. One adult specimen examined at New Market early in August was of a clear, bright orange brown, with the diagonal dark brown bands of the back sharply defined. In others the colors are of a rusty, dingy hue, without sufficient definition to make the characteristic markings distinguishable.

The young are of a livid flesh tint, but more or less brown on the back, the pattern of marking becoming more clearly defined as they grow, and is quite distinct when the reptile has reached the length of ten or twelve inches. As might be expected, the color and markings are much brighter just after the snake has shed its skin than at any other time.

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Moulting.—I have found the freshly shed skins of Copperheads and other snakes at various times from May until September.

When first shed, the skins are somewhat transparent and appear much larger than the body of the snake they recently enveloped.

The markings were very faint and indistinct upon those I examined, but could be recognized by their shape and size.

The skins soon become dry and brittle and more or less opaque. When the skin is shed entire, it is generally found in some damp or wet spot, but if it happens to be shed in a pile of stones, or in a very dry place, the skin will be found in pieces or ragged patches.

I observed this process in a pet rattlesnake to take place as follows: For several days before shedding the skin, he became unusually torpid and would select any wet spot in the box upon which to lie. The skin became detached first from about the mouth, and as the snake wriggled himself out, the skin was turned backward or inside out.

I was sorry to be unable to observe whether he would have shed his fang-teeth at this time, as other snakes are said to do, but the fangs had been removed a few weeks before by the friend who sent the specimen.

The presence of the Copperhead snake is often recognized by a peculiar odor which is thought by some persons to resemble that of fresh cucumbers. My own experience has been quite clear in recognizing this odor after my attention was called to it, and which shortly thereafter led to the finding of the reptile.

Fascination.—It is hardly necessary to say that the peculiar behavior of small birds and animals when about to be attacked by a snake is caused by terror, which deprives them of the power to escape from what they recognize as a deadly enemy, rather than any ability upon the part of the serpent to fascinate or charm, as has been sometimes stated.

Snake-bite.—As a matter of interest, I have made inquiry of a number of physicians in my neighborhood relative to the effect of snake-bites. Many have seen and treated persons who

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were bitten by either the Rattlesnake or Copperhead, and I have yet to find one who knows of, or has ever heard of, a well authenticated case in which death occurred from snake-bite.

Last August I examined a colored child four years of age who had been bitten three times on the leg between the ankle and knee by a Copperhead snake which measured 37½ inches in length. Two of the wounds showed the imprint made by a single fang, while the other one exhibited marks of both fangs.

With the exception of whiskey given to the child just after the wounds were received, and the application to the swollen limb of cloths wrung out in warm water, no other treatment was found necessary, and in four days from the date of injury the boy was running about as usual, while the swelling had almost entirely disappeared.

Notwithstanding the exposure to which our troops were subjected during the late war, there was not a single case of death from snake-bite reported among our war statistics.

Death does, however, sometimes follow the bite of a venomous snake under suitable conditions in certain southern parts of our country, and then prompt measures become necessary to save life.

As a natural sequence to the foregoing observations, it may not be out of place to remark that among the most rational remedial methods, and those which have proved to be of actual benefit, were the application of a ligature immediately above the locus of injury (if it were an extremity), to prevent the return of the poisoned blood to the general circulation; also scarifying of the wound, excision, cauterization, injecting into it the strong water of ammonia, iodine, or perchloride of iron, etc. That, however, which is considered by some to be the best remedy is the injection of a solution of permanganate of potash into the wound. This latter agent will at once destroy the poison with which it comes in contact, and will at the same time cause the death and sloughing of the surrounding tissues; this is, however, a small matter where life is at stake. But besides all else it should be observed that early and free stimulation of the patient should not be neglected. These, though few, seem to be the most important facts thus far brought to my notice relative to our native Copperhead snake.

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NOTES AND ILLUSTRATIONS TO "OBSERVATIONS ON THE CRETACEOUS AND EOCENE FORMATIONS OF MARYLAND."

By P. R. UHLER.

Continued studies of sections exposed in various parts of the sedimentary region, described in the two former papers printed in these Transactions, have brought out more distinctly many of the relations and combinations of several characteristic divisions of both the Cretaceous and Eocene deposits on the Western Shore of Maryland.

It is now possible for us to recognize here, without much difficulty, most of the principal members of the Cretaceous system as they occur in the State of New Jersey. In order to give a distinct idea of these beds and strata, as far as we have found them to exist here in a single series, we have added a diagrammatic sketch on a horizontal scale of one mile to an inch, along a register line, extending from the head of Marley Creek to the Severn and continuing along the north shore of that river to near its mouth.

It will be observed from an inspection of Plate A that the POTOMAC FORMATION lies at the base of the series, farthest inland, and is consequently the oldest of the column. A few miles further northwest it rests upon the primitive rocks, and is thus seen to be the lowest of our sedimentary formations.

It is composed of beds of sand, fuller's earth, gravel and cobble-stones at base, while farther up it consists of beds and thick strata of indurated clay, sandy clay and broken clay, interstratified with quartz sands of angular grains. The coarse sands of the lower division are often charged with nests and bits of fuller's earth or kaolin clay. A thin belt of dense iron paint-stone usually rests on top of the coarse white sand of the basal series, and separates it from the stratified grits and lead-colored fossiliferous clays of the series next above. Above this rests a series of pale and red clays, often broken and mixed near or at the surface, usually called "variegated clays," more or less invaded by sands, and sometimes carrying sparsely distributed quartz pebbles.

Into the eroded figure of this Potomac formation the COLUM-

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BIA FORMATION fits, and its *fluviatile* member fills out the borders of old channels, basins and coves, chiefly near tide-water. The *interfluvial* member extends up to a level of about 250 feet above tide in the city of Baltimore, while the other is frequently met with at levels from below tide up to 75 feet. It is mostly composed of pale ferruginous sands and loams, charged with coarse boulders, interspaced with areas of brick clay, throughout its tideward member; while it is less regularly stratified, charged with beds of angular sands ranging from white to red, and is overlaid by earthy clay full of small, chiefly rounded boulders, in the elevated member which rests between the rivers and creeks.

This formation belongs to the Quaternary period, and lies farther inland than the section included in the accompanying plate.

The ALBIRUPEAN FORMATION next succeeds the Potomac, and rests upon its outward slope.

It is well characterized by thick strata of white sandstone, white sand and white clay, which form the hills and cliffs along the Severn river, from above its head to Sullivan's Cove at the upper end of Round Bay. Immediately east of this great body of clean sands and clay appears a prominent arrest in the continuity of the region, and we at once pass to a different type of structure, showing a marked change in the component elements of the beds.

This is the point where the typical CRETACEOUS SYSTEM of strata comes into view, underlaid by a peculiar division composed in great part of alternate layers of drab or yellowish fossiliferous clay and fine white sand, which for convenience may be called the *Alternate Clay-Sands* member. This forms a body of beds and strata underlying the Lower Black Marl Bed, and underlaid in common therewith by a stratum of ferruginous coarse sand and sandstone. It is greatly eroded beyond the pavilion, and again below the hotel, on the Round Bay picnic grounds. Near its inner border it rises into hills 30 to 50 feet high, and overlaps the clay of the Albirupean shore. Next the base it displays a laminated bed of black earthy matter, which is loaded with iron pyrites, lignite and fragments of twigs and leaves of trees. It is also interrupted by large beds of coarse,

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dull quartz sand and small pebbles, having the general appearance of broken, crude alum. One of these beds directly underlies the first exposed cliff of the Black Marl below the Round Bay boat-house. A minute detailed account of this member must be deferred to a future occasion, since it alone would furnish materials for an extensive memoir. It, however, forms a stratigraphic unit of great distinctness, and occupies the same relative position as that which is held by the Laminated Sands in New Jersey.

Above and extending seaward from the clay-sands rises the great *Lower Marl Bed*, which here is marked by three distinct units of composition. The lowest is the *Black Marl*, which forms a body of clayey sand, often indurated at base, and sometimes loaded with large masses of dense iron-stone. It is fully 50 feet thick in its greatest development, has suffered erosion at various points along its exposed surfaces next the river and creeks, and along its inward thin extension it is densely charged with leaves and fragments of plants and trees. At frequent intervals and at various levels it is also loaded with the iron-coated, friable casts of many species of fossil shells, typical of the Cretaceous, and it holds besides two or three kinds of shark's teeth.

On top of the Black Marl, and sometimes settled into it so as to show no base line of demarcation, appears the *Clay Marl*. This differs from the preceding by being usually of a more or less greenish color, composed of fine sand, loaded with clay of a pinkish drab or lead-color, but which when altered by atmospheric agencies appears yellow or pale brown. It forms a connected series of beds, or an irregular stratum, at most 30 feet thick, but usually not more than about 12 to 20 feet thick.

Next above this Clay Marl rests the thick deposit of fine sands which, for the sake of present recognition, we have called the *Mottled Sands*. This is a very conspicuous member of the series, which grades below into the sand of the Clay Marl, and from which there is often no appreciable line of demarcation. The sands composing it are not so fine as in the member next above. They are generally of a pale greenish color, streaked and spotted with orange or paler yellow patches, or short stratified aggregations, discolored by ferrugination.

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This determination of ferrous solutions towards particular spots, or small deposits, of the sand has not yet been accurately described, but it is a marked characteristic of some parts of this member, and it occasionally spreads so widely as to include all the material in an area many rods in length and several feet in thickness. This member rises to altitudes of 70 to 80 feet above tide, and it extends from the upper end of Round Bay to about a mile and a half from Chase's Creek. It occupies the position which is held by the Red Sand in New Jersey, and it may yet prove to be the less altered representative and continuation of that member of the Lower Marl.

It is a moderately compact body of sand in most parts, but it is slightly mixed with atoms of clay in its lower division, and shows indistinct stratification in some beds of its upper portion.

MIDDLE MARL BED, of the New Jersey system. This great body of greensands and clayey sands forms a comprehensive series of beds and strata, which along the register-line here adopted is chiefly represented by two thick members, differentiated from the underlying strata by a greater proportion of coarser glauconitic grains, imbedded in variable coarse quartz sand, and also by the conspicuous presence of great aggregations of laminar iron-rock, twisted and bent along horizontal lines, or grouped together in oblong pockets or cells.

The underlying member, or *Loose Marl*, which in some places is made up almost entirely of glauconitic grains, is here chiefly a stratum of loose greensand, mixed with a varying proportion of quartz sand, presenting a greenish gray appearance when not altered to a yellowish brown color by ferrous solutions. This Loose Marl, as it has been called to designate it from other members of the Cretaceous system, is first exposed a few rods below the railroad station at Round Bay, and continues on in varying thickness, with a distinct eastward slope, until it passes beneath tide about one mile above the railroad bridge on the Severn river. Its greatest development is in the vicinity of Chase's Creek, where it rises to an altitude of fully 70 feet above the tide; but at its inner end, adjoining Mount Misery, it tapers off to a thickness of less than five feet. In a section which is well represented a short distance below

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Aisquith's Creek, the upper 25 feet of this member is distinctly indurated, is highly ferruginated, and is often clearly separated from the loose sand upon which it reposes.

Cell Marl.—Above this rests the uppermost member of the Cretaceous thus far discovered on the Western Shore of Maryland. It is mostly composed of dark greenish gray marl, and narrow ferruginous strata imbedded in highly glauconitic sands of coarse and variable texture. It is locally indurated in belts of various widths; and in its upper division is often closely set with twisted, pocketed, or cell-shaped, laminar iron-stone, the cavities of which are filled with coarse, dry, grayish greensand, holding white fragments of *Terebratula harlani* and *Gryphaea vesicularis.*

For convenience of distinction the name Cell Marl is here applied to this member, since it does not precisely accord with any named part of the Middle Marl Bed of New Jersey. It is to be correlated with the "Shell Layer" of Prof. Cook, Geol. N. J., 1868, p. 269, but it is much more heterogeneous in composition, and does not possess the stratum of fossil shells which is so characteristic of it in Delaware and New Jersey.

This upper division of the Cretaceous Marls forms a very conspicuous unit of structure, which constitutes a large part of the high hills from below Aisquith's Creek to the mouth of the Severn river. In the deep cut above Winchester's Station it rises to a height of 58 feet above the railroad, and thus reaches an altitude of over 90 feet above tide. Below this point it is profoundly eroded at irregular intervals, and forms the body of a few abrupt single hills. Below the railroad bridge it mainly slopes to a level of about 40 feet, and at length tapers off to about 20 feet above tide, where it terminates near the mouth of the river.

EOCENE.—This basal member of the *Cenozoic* system of rocks is well represented along a great part of the extent of the section given in Plate A. Wherever it is accessible along this register-line it rests on or immediately beneath the surface of the country, and it is least disturbed and most developed in those hill-tops which swell separately above the surrounding level of the region.

Here it is chiefly ferruginous in all of its phases. At base it

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is a body of coarse, irregular sands and greensand, loaded with snuff-like sand and atoms of clay, becoming indurated as it ascends. It holds a small proportion of fine gravel, especially next the bottom, and its upper portion is usually consolidated into hard sandrock. In the coarser parts of this sandrock fossils are seldom found, but in the finer and more clayey portions fossil shells, or their casts and moulds, often occur in large numbers.

This structural unit is unconformable with the upper member of the Cretaceous Marl system, upon which it rests in great part, but it is generally hard to mark the line of separation between the two, because of the similarity of their elements along the line of contact. Wherever the loose marl sands of the two members are brought in contact they mix together and no break is distinguishable; but where induration is present in either, the line of demarcation can be distinguished by careful examination.

The Eocene sandrock and the sand resulting from its disintegration is, however, by no means confined to the surface of the Middle Marl bed. It extends farther inland than that member, rests upon other members of the Cretaceous, and near its inner thin edge lies upon Albirupean sands, and attests its identity by holding typical Eocene fossil shells.

Much of the ferruginous sandrock of the region east of Curtis Creek, which we had previously regarded as of Quaternary origin, has, by close inspection, been found to hold fossil casts of Eocene type. Accordingly, it would appear that at length we are justified in referring all the sandrock of this pattern, now in place upon the hills of this part of the Albirupean region, to the Eocene period. Even in localities where this sandrock abounds in fossil shells there are large and continuous beds of it in which no fossils can be found.

The greatest thickness attained by the Eocene of the territory represented by the diagram is thirty feet. It is of about that thickness on Mount Misery, and is there remarkable for being loaded with broken and chiefly angular pieces of the ferruginous sandrock, packed in close aggregations in many parts of the bed.

The fact yet remains to be explained how it came to pass that sheets of this stone, ranging from two feet to only two or three

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inches in thickness, have become broken into countless small angular pieces, and spread through or upon the soil of fields in almost the entire peninsula, from near Chesapeake Bay to above the head of Severn river. Multitudes of these have been gathered from the fields and placed out of the way beside roads or in fence corners, but vast numbers of them still remain, and point to the presence of layers of rock which once spread over the higher inequalities of the country at the close of the Eocene period.

The diagrammatic sketch shows the position and thickness of these Eocene deposits on the surface of the other formations, and it indicates the most extensive and thick part of its sand-rock and sands, from a point near Round Bay station, following the undulations and dip of the upper member of the Cretaceous, to within one mile from the mouth of the Severn.

The sections sketched beyond may prove to be of some use in illustrating the descriptions given in the foregoing papers.

The following section exhibits the thickness and order of succession of the beds as seen in the face of the cliffs on Piscataway Creek, beginning a few rods behind Fort Washington and extending about three-quarters of a mile up the creek:

Quaternary.....	Gravel and yellowish sand with some boulders of quartzite and gneiss.....	5–8 feet.
Partly Eocene....	Ferruginous or reddish sand, with indurated or stony fragments showing obscure casts of shells.....	6–12 feet.
Middle Marl Bed?	Ferruginated greensand, grading into the ferruginous sand above.....	2–3 feet.
Cretaceous.....	Fine-grained greensand marl which mixes with the efflorescent, more grayish marl beneath.....	30 feet.
Lower Marl Bed.	Lower black marl which becomes more fine-grained and powdery above. Underlaid by indurated, ferruginated marl, or dense iron-stone, and loaded with numerous casts of fossil shells above the base.....	12–15 feet.
	Base of this member gravelly for several rods.....	1½ feet.
Albirupean.....	Whitish clay, mostly cracked, and jointed in small segments.....	2–7 feet.

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Potomac.....	Variegated, mixed or broken, partly sandy clays above. Drab or lead-colored beneath, stratified to water level, and holding lignite and leaves of various plants and trees.....	28–30 feet.

Section in the cliff near bridge below the town of Upper Marlboro, Prince George's county, Md.

Miocene.....	Yellowish sandy clay, becoming mottled and of a more lead or pinkish drab color below.....	15–20 feet.
Eocene.....	Argillaceous greenish marl, rich in coarse glauconite grains, with a few drifts of ferruginous rock fragments, and some pockets of coarse loose marl-sand	40 feet.
	Siliceo-calcareous dense rock packed with shells and their casts imbedded in pale greensand	5–8 feet.
	Underlaid by loose greensand and shells packed in confusion.....	3–5 feet.
	Coarse greensand marl to bottom of stream.....	2 feet.

Section on branch at inner end of Swan Creek, entering from the southeast.

Quaternary gravel. Miocene?.....	Pale yellow sandy clay, with some quartz gravel on surface.....	6–15 feet.
Eocene.....	Blue-black marl, very compact in most parts, indurated below. Closely packed bed of *Turritella mortoni* near top. Followed, lower down, by scattered specimens of *Ostraea compressirostra* and *Dosiniopsis meekii*. Still lower down, *Latiarca gigantea*, and occasionally *Cardita planicosta*. Basal 15–20 feet beds of larger *Ostraea compressirostra*.....	60 feet.
Cretaceous.....	Argillaceous greenish marl running down to black marl of the lower marl bed.....	40 feet.

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MAR 13 1903

LIST OF BIRDS RESIDENT IN SUMMER NEAR THE CITY OF BALTIMORE.

By ARTHUR RESLER.

This list, which includes our resident birds, is based upon specimens collected and direct observations made in the vicinity of Baltimore, chiefly within a radius of five or six miles therefrom; but occasionally from a distance of twelve to fifteen miles southeast from the city, since I had frequent opportunities to visit that part of the country.

Excepting with regard to one species, sent to me for identification, I have confined myself to personal observations, and in no case have I relied upon the statements of other persons, nor upon the authority of the distribution of birds as generally recorded.

While it is not the purpose of this paper to write a natural history of our birds, nor to discuss questions of classification, it seems expedient to offer here and there such notes and remarks as may throw fresh light upon their peculiarities, habits and distribution. In further elucidation of the subject, the musical notation of a few songs of species are given, and such as will probably excite general interest. This procedure must, however, be considered as a first attempt, and rather as opening a branch of ornithology which the writer intends to pursue in the future as opportunities offer.

The nomenclature here given, in so far as the names, both scientific and common, are concerned, is that adopted by Mr. R. Ridgway in his "Manual of North American Birds," and the order here followed is that given in one of the older catalogues of the same author, published in the "Collections of the Smithsonian Institution."

[May 1, 1891.]

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PART I.

Order PASSERES.

Perching Birds.

Turdus mustelinus (Gmel.). Wood Thrush.

This well-known bird, although not remarkable for brilliant plumage, surpasses most, if not all, of our songsters by the character of its song. This is in the highest degree musical, resembling the tones of a flute, or when heard from a distance recalling the flageolet tones produced on a violin. The principal strain may be given by the following musical notation :

From early in May and throughout the summer until about the middle of August its song may be heard from the bushes and thickets, in the early morning or late evening, no matter what the weather may be, whether serene or overcast. This bird arrives toward the close of April and leaves about the end of September. During its stay it frequents shady woods, especially near the banks of a brook or small river. The nest, which is in part composed of mud, is usually attached to an alder bush, frequently about four or five feet from the ground. The writer found the young of this bird, not yet able to fly, in the early part of August, and these appeared to have been representatives of a second brood. Although quite common, it appears to be not so well known as the majority of our other songsters, in consequence of being more solitary and shy, which tendency seems to increase toward the time of departure, when it stealthily makes its way through the thickets.

Turdus unalascae Pallasii (Cab.). Hermit Thrush.

While the capture last summer of a single specimen of this species seems to me purely accidental, I venture to place it here in order to give fulness to this list. The bird when taken was apparently in good health, and it was not one which had been

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detained by being hurt or crippled. The date of capture being in midsummer—July 9th—excludes the idea of an early migration in this case.

The following observations, which were printed for me in *Forest and Stream*, Vol. XXXV, No. 1, seem worthy of more permanent record: "On July 9th, while traversing the woods in Howard county, Md., about fifteen miles southwest of Baltimore, my attention was attracted by a thrush, which at once I saw was not the wood thrush (*Turdus mustelinus*). I shot the bird and was astonished to find it a hermit thrush (*T. pallasii* Cab.). The decided rufescent tail and tail coverts contrasted with the olive brown color of the head and back were sufficient to identify it. Knowing that there is no record of the occurrence of this bird in summer south of Massachusetts on the Atlantic coast, I give some account of its characteristics. Comparing it with the descriptions in Ridgway's 'Manual,' Coues and Baird, and with a mounted specimen in my collection, shot in fall, I could find no difference except in the bill, which, though not as bulky as that of the wood thrush, is longer and broader than in the mounted specimen. The measurements from the nostrils to the tip of the bill were as follows: Mounted specimen of *T. pallasii*, .36 in.; the above specimen of the same species, .40 in.; *T. mustelinus*, .48 in. That this bird was not a young specimen of *T. mustelinus* is shown by the fact that a young bird of that species which I caught with my hands, and which had the tail only half developed, showed the cinnamon color of the head, the spotted sides beneath and the olive brown color of the tail, while in my specimen of *T. pallasii* the colors of the various parts differ in no respect from the mounted specimen in my collection. On dissection this bird proved to be a female. The œsophagus contained the whole of a grasshopper, apparently the larva of œdipoda. Before concluding, I desire to speak of the time of arrival and departure of this species in the immediate vicinity of Baltimore. About the first or second week in October it makes its appearance, and is very common through that month, its number diminishing gradually as winter approaches. The last specimen I obtained in fall was November 23d. A few remain here throughout the winter, as I have

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shown in a paper printed in *Forest and Stream*, Vol. XXVIII, No. 6. The earliest date in spring at which I procured a specimen was March 5th, but toward the middle or close of the same month it becomes more plentiful. About the close of the following month it disappears entirely."

Merula migratoria (Linn.). American Robin.

The Robin is one of our most abundant and best known birds, familiar alike to the farmer and to the gunner. The habit of this bird is but partly migratory, but the greater number seem to winter farther south than this climate, becoming plentiful the middle, and sometimes not until the close of February. The following month they are found all over the country, congregating in small flocks, which disband as spring advances. In fall, especially in October, flocks are again formed, and the number of birds is greater even than in the spring. As winter approaches there is a steady decrease in these numbers, with a glimpse now and then during the winter, until the spring finds them with us again.

During the fall migration the robin shows a decided partiality for the fruit of the sour-gum tree (*Nyssa Sylvatica*). This preference it has in common with the "flicker." The nest greatly resembles that of the wood thrush, in that both contain mud in their composition, but owing to the less shy disposition of the robin, its home is often made in close proximity to men. Nests have been observed at places where hundreds of people would pass, in fact at popular resorts, and the bird showed no signs of fear, the nest being situated, however, well up the tree, where it could not be easily disturbed.

Galeoscoptes carolinensis (Linn.). Catbird.

With regard to the name of this bird the Latin saying, "*Nomen est omen*," well applies. Owing to the law of priority, the species name "*filivox*," which aptly describes the bird, must be set aside for that of *carolinensis*, which virtually means nothing. Being equally common in New York, Maryland and Virginia, the name would have been as descriptive, as it now stands, had

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it been *virginicus*, etc. This dark-colored songster arrives in this vicinity about the latter part of April, leaving some time in October, having been observed as late as the 22d of that month. The arrival is made known by the characteristic cat-like notes. Besides these sounds the bird has a regular song, no order in the strains, but reminding one of the chatting and gabbling of talkative people, amusing however to the listener, and seemingly also to the singer. The nest, situated in bushes and briers of every description, along roadsides or near the farm house, is made of dry leaves, small rootlets, and stalks of different weeds. Even rags and pieces of paper have been found in the composition. In the construction of the inner lining smaller rootlets are used than on the exterior of the nest. The eggs, usually five, sometimes only four, are of a very dark bluish-green color, and show no indications of spots. Nests containing eggs are found all through June.

Harporhynchus rufus (Linn.). Brown Thrasher.

This songster is better known under the common names of "Red Thrush" and "Sandy Mocking-bird," but the latter is the name by which it is best known by our farmers and people generally. The bird is as common as the catbird and frequents the same places, but its habits are not the same. The sandy mocking-bird delights in the early morning to rest upon some tall tree or telegraph wire by the roadside and peal forth its beautiful and vigorous song. Another habit is to run in thickets or even small open places, scratching the ground, and among the dry leaves searching for insects. The nest is not a very fine structure, and is placed among bushes and brambles. It contains four or five brown-speckled eggs, which are somewhat larger than those of the catbird. Judging by the different months in which eggs have been found, the writer concludes that two broods are hatched during the season. This bird appears early in April, about the first week, and departs for the South about the first week in October.

Sialia sialis (Linn.). Bluebird.

This well-known bird is but partly migratory in its habits,

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seldom entirely leaving us during the winter. On ornithological excursions during the months of December and January one rarely fails to see this bird, but February brings to us the majority. This, however, is dependent on the exigencies of the season. The blue garb makes this bird conspicuous everywhere, especially since it does not seek to conceal itself in shady woods or bushes and thickets. The song is a plain warble. Beside these regular notes, there is a call-note which is very characteristic, and which cannot easily be confounded with that of other birds.

The nest is placed in holes, usually in an old cherry or apple tree. The eggs are of pale blue, and in shape are, on the average, a little more globose than those of the catbird. It is hardly necessary to state that our bird is an exceedingly common and abundant species, except, as above mentioned, during winter.

Parus bicolor (Linn.). Tufted Titmouse.

The "Tufted Titmouse," also known as the "Crested Titmouse," is one of our resident birds, and may be found almost anywhere in the depths of the woods, or among the trees and shrubs that border our waters. In winter it associates with various smaller birds, as for instance, chickadee, creeper, et al., and is quite common near the suburbs, and has been seen and heard even in the midst of the city. During the summer months, however, this species seems to retire to a part of the country less densely populated. Though quite common, it is not so abundant as the next species, that is as regards the immediate vicinity of the city. Being of a somewhat more shy and suspicious disposition than its relative, the chickadee, this might be easily explained.

The most distinctive characteristic of the tufted titmouse is the whistle, consisting of two tones, forming a fourth, as here indicated:

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Besides this it possesses a few other very squeaky notes, entirely at variance with the musical whistle, and both may be heard throughout the whole year.

Parus carolinensis (Aud.). Carolina Chickadee.

This restless little bird is likewise a resident, sharing with the preceding species the same habits and frequenting the same localities. The Chickadee, like the titmouse, prefers the vicinity of the city mainly, if not wholly, during the colder season. In winter, whenever and wherever we may go, we are sure to find these jolly birds. They form little parties amongst themselves, or in company with the creeper and "golden-crowned kinglet," and soon make their presence known by their incessant squeaky notes. Besides this unmusical squeaking, the chickadee possesses a very simple, although neat little song, which may be given by the following syllables, Twe-da-we, twe-da-wit, given with a kind of nasal twang. This strain is heard not only during the summer, but also during the winter. The nest, an exceedingly cozy-looking structure, is made partly of moss. One nest, found early in May, was hid in the stump of a small tree about five feet from the ground, and contained six eggs. The eggs were white with a faint rosy tinge and speckled with reddish brown, these speckles predominating near the thicker end. The appearance of the eggs did not indicate that incubation had begun.

Sitta carolinensis (Lath.). White-breasted Nuthatch.

Of the two species of Nuthatches which the writer has observed near Baltimore, this is the more common, and the one which remains with us during the warm season. It is in the fullest sense a resident bird; and it is in my opinion the best climber of our woods, not even excepting the species of woodpecker. When we consider the absence of support from the sides of the tail, the feathers there being soft, and observe its practice of climbing downward, we are constrained to admit that it possesses qualities not attained by the most advanced of the woodpeckers. The absence of a scansorial tail, of course, forces the bird to rely for support solely on his feet, and this causes a

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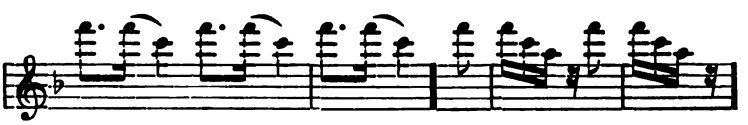
kind of climbing different from that of the woodpecker. This bird is easily recognized by its notes, which sound like "quank," and can be heard for some distance. It may be found in woods of all kinds, and also among the trees that border the rivers, which it does not leave unless forced to do so. It may not be amiss to mention the older and better known English name, White-*bellied* Nuthatch, but the name above given is to be preferred, as the difference in the two species is more marked on the breast than on the belly.

Thryothorus ludovicianus (Lath.). Carolina Wren.

The powerful and very musical notes of this bird command our attention. Especially is this so during winter, when our migratory songsters have left us and our remaining ones are voiceless. Now here, now there, we hear the notes, and often considerable time is required to locate the singer. We become familiar with the song long before we know the bird that makes it. Wilson represents this song by the words, "Sweet William," but some imagination is required to make the sounds coincide. It may be more accurately given by the syllables, "Dee-deed-la, dee-deed-la," generally speaking, but sometimes the sounds come nearer "Dee-deea." The musical notation would be about—



I have often wondered at the seeming indifference of this bird to the seasonal changes of our climate. It has been heard pealing forth (sit venia verbo) its strains in summer when the thermometer registered ninety degrees, and again on one occasion in winter, when the temperature was below twenty degrees. The bird is usually found in bushes, shrubs and small trees near some brook or rivulet. One specimen was obtained from the top of a rather tall tree, but that abode was so unusual that a memorandum was made of the fact. This wren is by no means uncommon, neither is it abundant. It is a resident bird, and no difference has been observed in its distribution during either winter or summer.

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It has been noticed that there seems to be a spirit of rivalry among these birds when singing, one trying to outsing the other. They also answer one another, and it is worthy of remark that the answers are not given in the same pitch.

Troglodytes aidon (Viell.). House Wren.

About the latter part of April, this "house friend" makes its appearance. As the common name indicates, this wren especially prefers the neighborhood of men, and breeds regardless of their proximity. If a box be provided in a tree near the house, the nest is built there, or in some convenient hole in the house. On account of its familiarity this species is liked wherever it makes its abode, whether it be near the farm house or in the city. In the city of Baltimore it is not as common as formerly, probably, if not certainly, on account of the presence of the "English Sparrow." The song of this bird is a kind of warble; soon recognized, but difficult to indicate, either by syllables or words. In the beginning of October, about the time of the arrival of the "winter wren," the house wren takes its leave. This species is seen to be more abundant than the preceding.

Cistothorus palustris (Wils.). Long-billed Marsh Wren.

In its nidification and the localities which it inhabits, this wren differs greatly from its relatives. In the marshes and swamps of our rivers, for instance Back or Patapsco, where covered with "water oats" (*Zizania aquatica*), and reeds, mostly "cat tail," with here and there a patch of pickerel weed (*Pontederia cordata*) we find the wren in adundance during the entire summer. It arrives here late in April and remains until near the end of September, and sometimes a straggler is found as late as October. This bird affects exclusively swamps and marshes, and has not been observed to venture away from the water, since its chief delight is to scramble up and down the reed stems growing there. Now and then, one will rise a few yards straight into the air, during this time lustily singing, if indeed we can so call their screeching and crackling notes.

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Wilson compares these notes to "the crackling sound, similar to that produced by air bubbles forcing their way through mud when trod upon," but this is rather too hard to state about our little friend. The nest is a semi-globose structure, hollow, with a hole on one side. Being composed mainly of the leaves of the reeds, interwoven with one another, with some hanging down or sticking out, it does not present a very neat appearance. This nest is always attached to the stems of the reeds, usually typha, and so constructed that sometimes as many as five or six of the stems pass through its walls, thereby making it very secure. The eggs are small, about five or six in a set and are of a dark color, similar to that of chocolate. The writer has found nests with eggs early in June, and again in July, making it extremely probable that there is more than one brood in a season.

Mniotilta varia (Linn.). Black and White Warbler.

Of the smaller birds that inhabit our woodlands, the "Black and White Creeper," as it is usually called, is certainly one of the most characteristic. This bird climbs the trees in all directions, with a dexterity and agility entirely foreign to our other warblers, and only to be found again in the true "creeper," a common winter bird whose place it seems to take during summer. The writer has never heard the bird utter sounds that might be called a song, the only notes given forth being some screeching ones, usually uttered as it flies swiftly from one tree to another. It arrives in this region about the third week in April, and leaves in October, having been observed as late as the ninth of that month. This species is rather abundant in suitable localities, and not possessing a shy disposition, its habits may readily be observed.

Helmintherus vermivorus (Gmel.). Worm-Eating Warbler.

Although a regular summer visitor in this latitude, we have to consider this Warbler as a rather uncommon bird, and one which has been nowhere found abundant. It seems to prefer woods and groves composed of small trees and bushes, with thick un-

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dergrowth, where it is observed to fly from tree to tree as if in search of insects. Its motion reminded me sometimes of the darting of the flycatchers. The bird was formerly to be found among the groves and copses bordering the Back and Patapsco rivers, and did not appear at any time fond of running on the ground. It remains continuously from about the 10th of May until some time in the month of September.

Dendroica aestiva (Gmel.). Yellow Warbler.

Of the genus "*Dendroica*" proper, this is our most common species, and the one which, owing to its habits, may be most readily observed. The "Yellow Warbler" frequents small trees and shrubs along the road, or willows and similar trees along the water, and even visits our gardens and yards, especially on its arrival, which is about the 24th of April. As early as the second or third week in September, it takes its departure. The notes, although not very remarkable, make a pleasant warble, sounding something like the syllables dui-dia-dee.

Dendroica discolor (Viell.). Prairie Warbler.

One not acquainted with the notes of this little warbler might readily conclude that it is a rather rare summer visitor. Although not quite so common as the "yellow warbler," in suitable localities it is abundant all through the summer. The favorite habit of the bird is to hide in the foliage of some evergreen, for example the cedar, but it does not adhere exclusively to such trees, and betrays itself by the curious notes of its song. The notes sound like the syllable "Ts," which gradually grows higher and louder, and abruptly terminates with the syllable "Ee-a," pronounced with emphasis. The time of the arrival in this locality is about the same as that of the "yellow warbler," and the departure takes place in September.

Dendroica vigorsii (Aud.). Pine Warbler.

Early in April, the Pine Warbler makes its appearance, and becomes more abundant throughout this month in all suitable localities. Later on, the numbers greatly decrease, so that as

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summer advances it becomes less numerous than most of our other warblers. In the fall, and especially towards the time of its departure, near the end of October, it once more becomes numerous. Both in the spring and fall, the writer found this species in barren grounds and fields, overgrown with small pines, such localities, without doubt, being preferred by it. Nevertheless, we obtained specimens in shrubbery and undergrowth, as well as in some woods, destitute of coniferous trees. During the period of migration, it gathers together in flocks, composed of a dozen or more individuals, which alight on the small pines and at times are also seen on the ground. Except a chirp, common to most of the smaller birds, the writer has never heard it utter a sound which might be called a song.

Seiurus aurocapillus (Linn.). Oven Bird.

One of the most common birds to be found in the woods during the summer is this species, better known under the name of "Golden-crowned Thrush." Soon after its arrival, which is about the 20th of April, the woods almost ring with its loud voice. The song consists of but one syllable or tone, frequently and rapidly repeated. This song, if once heard, can with ease be always distinguished from that of other birds. In sunshine or rain, even during thunder and lightning, the loud notes of this species have been heard. It delights to run on the ground among the leaves, after the manner of the "towhee," and the "red thrasher." This warbler is distinctively a woodland bird, and is seldom, if ever, observed outside of such places.

The nest is placed on the ground and is usually covered, and has an opening on one side. This mode of construction of the nest has caused the bird to be called "oven bird." About the middle of October it leaves us, the 18th being the latest that it has been observed, but long before that time it has become silent and retired.

Seiurus motacilla (Viell.). Louisiana Water Thrush.

According to our observations, this is a rather rare species around Baltimore. The few that have been noticed have been

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seen in damp woods, along the side of a brooklet, during the month of May and again in July, and seem of a rather shy and quiet disposition. Its song is as yet unknown to the writer.

Geothlypis trichas (Linn.). Maryland Yellow-throat.

This dainty little bird arrives in this latitude about the 20th of April. In October it moves south to more congenial quarters, the 10th of that month being the latest that any have been noticed. This species is one of our most abundant summer birds, frequenting bushes, brambles and all kinds of undergrowth in the neighborhood of water, and, like some of the wrens, it has been obeerved even among the reeds in marshes. The song cannot be better imitated than by the syllables Wilson has already given, viz., "Whititee," the accent being on the first syllable. But the note habitually and more frequently heard, is a kind of chuck, a call note, common to many of our smaller birds. An acute observer can usually distinguish the different birds, even though the call notes resemble one another.

Icteria virens (Linn.). Yellow-breasted Chat.

This is certainly one of our most interesting and characteristic birds. The song or notes, be it what it may, is such a mixture of all possible sounds, that it really astonishes one. Such an incessant chatting and gabbling is kept up, that the bird is readily distinguished, for not one of our other birds exhibits such peculiarities. This bird is common, but is usually more frequently heard than seen. Often, when after considerable effort we seem to have located the place from whence the sounds come, we look and watch in vain for a glimpse of the bird.

The nest is usually placed among the thickest briers and brambles, and is composed chiefly of dry leaves for the exterior, the inner lining being of thin strips of grape-vine bark. The eggs, four or five in number, are white, with brownish spots. This bird arrives here about May, and leaves late in August, the writer never having observed a specimen after that month.

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Sylvania canadensis (Linn.).

This is one of our rarer summer birds, which during the spring and fall migration is not at all uncommon in its favorite localities. The disposition of the bird is quiet and retired, dwelling in trees and busying itself in the catching of various kinds of insects. It is most common during the first and second weeks in May; after that time the number becomes gradually smaller, and, as a rule, not many remain with us during the summer. In September again it becomes more numerous, but soon leaves us for the winter. The writer has had no opportunity of hearing the song, and consequently can make no remarks upon it.

Setophaga ruticilla (Linn.). American Redstart.

From the latter part of April until early in October this species is a constant and common inhabitant of our woods. The habits of this bird are the same as those of a flycatcher, while on the wing constantly pursuing little insects, and diving, so to speak, after them in all directions. The notes are meagre, and it is almost impossible to imitate or represent them by words or syllables. Sometimes notes are uttered which sound like the noise made by the smacking of the tongue.

Vireo olivaceus (Linn.). Red-eyed Vireo.

Of the three species of Vireos that the writer has observed near Baltimore during summer, this one is by far the most common. This agreeable little bird may be met with almost anywhere except in coniferous woods, which it does not frequent. Its appearance the latter part of April is soon recognized by the pleasant and continuous warble. Owing to its plumage, which the name bespeaks, the bird is well protected by the green foliage of the trees which it inhabits, and for this reason is easily overlooked as it becomes silent on the approach of September. It does not leave us until the close of that month, and has been observed as late as October 5th. The nest is pensile, is placed in a small oak, and is attached to two twigs, which are sometimes, but not always, forked. In appearance it is basket-like,

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and composed of various kinds of material, such as leaves, pieces of wasps' nests, strips of bark, etc. The inner lining is composed of fine strips of the bark of the grape-vine and the stems of grasses. It has been stated that hair is used in this lining, but the writer has never met with it in his observations. The eggs are pure white, irregularly marked near the thicker end with small dark brown specks. In a set of four eggs, three were observed to have a few dots near the smaller end, which were missing from the fourth. This set was taken in the second week of June.

Vireo noveboracensis (Gmel.). White-eyed Vireo.

This species makes its appearance about the same time as the red-eyed vireo, to which it is closely related. The writer has observed it in the fall, not quite as late as the former. Its ways are a little more vivacious and sprightly, but it frequents nearly the same localities, and its nidification is not essentially different, while its notes are quite distinct from those of that species. It seems to be quite common in this region, but less abundant than the red-eyed vireo.

Vireo flavifrons (Viell.). Yellow-throated Vireo.

During the period of migration this species is not so abundant as the two preceding ones, and in summer the difference in numbers is much greater. It frequents the medium-sized and large trees of woods in company with birds of its own kind, but sometimes with other vireos. The notes are rather weak, not nearly so loud and vivacious as those of the two preceding vireos, and show a marked difference in that respect. It arrives in this vicinity during the latter part of April and leaves toward the close of September.

Ampelis cedrorum (Viell.). Cedar Waxwing.

This well-known species, commonly called by the farmer Cedar Lark, may be observed from early in March throughout the summer until the early part of December, but varies greatly

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in numbers according to the season. During March and April it is not abundant, but may be met with occasionally. Throughout May, and even in June, it collects in flocks in localities suited to its wants, and always frequents woods in preference to shrubs and bushes, and in the fall feeds on different kinds of berries. The bird breeds late, as may be inferred from its keeping in flocks so late in the season. It has no song, nor does it give forth any peculiar notes. The nest is rather large for the size of the bird, is not at all neat looking, is almost entirely constructed of dry stalks of grasses, sometimes of poa, and is usually placed on an apple or other tree in the orchard. Rootlets and stalks of small plants which are common in yards and orchards, such as plantago, are also used in the construction of the nest. The eggs are three or four in number, of a bluish-gray ground color, thickly specked with small and smaller brown dots near and around the larger end, near the middle marked with some irregular, dark purplish-brown blotches, which are sometimes confluent, while around the smaller end there are only a few small dots. Besides these, the eggs have some irregular smaller spots of pale purple between the dark spots. One nest containing three eggs was obtained in the second week of July. Whether these belonged to a second brood or to a retarded first brood, we are not able to state.

Chelidon erythrogaster (Bodd). Barn Swallow.

This swallow, like the rest of its tribe, is one of the earliest birds to arrive from the South, reaching this vicinity about the first of April, at which time it is liable to be overtaken by cold and snow. Coming as it does, in large numbers, it is well known and liked by every one. Its habits are so familiar that it is unnecessary to make extended remarks upon that subject. As is well known, it breeds in barns and similar buildings. The cup-shaped nest is composed mainly of mud, and is fastened by one side to boards and planks of the different buildings. Toward the close of August it begins to collect in large numbers, which are continually increasing, and about the twentieth of September it departs for the South.

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Tachycineta bicolor (Viell.). White-bellied Swallow.

This beautiful swallow arrives early in April. It is very common and abundant during the spring, but is less so in the summer; the barn-swallow at that time being the more common of the two. It leaves this region early in September, and appears to be more attached to the water than the foregoing species.

Progne subis (Linn.). Purple Martin.

This is the largest, and, as far as the adult male is concerned, the darkest colored of our swallows. It is common throughout summer in open places, breeding near houses in boxes or other contrivances made for its use by the people. We have observed it as late as to near the middle of September. It delights to perch in company with the barn and cliff swallows on the telegraph wires of the roads, now and then darting off and making aerial evolutions, while the others clean their plumage or sing in plain and simple notes composed of guttural sounds.

Petrochelidon lunifrons (Say.). Cliff Swallow.

This bird has never been found by the writer to be numerous in this vicinity, either in spring or summer. During the latter part of summer we have observed it in company with the martin and barn swallow. The habits, time of arrival and departure are about those of the other species mentioned.

Clivicola riparia (Linn.). Bank Swallow.

This bird arrives in April, it is extremely common and associates in great numbers with its own kind. It frequents the banks, cliffs, etc., of our rivers and streams, and of the Chesapeake Bay. It breeds in holes made in these places. On one occasion, in July, at Bay Ridge, below Annapolis, at least two hundred of these holes, some close and others wider apart, were dug in all directions into the almost perpendicular cliffs, out of which holes the swallows would fly back and forth with the activity of a nest of bees. The eggs, which are laid in these holes, are white. About the middle or close of September it departs to a milder climate.

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Stelgidopteryx serripennis (Aud.). Rough-winged Swallow.

This species is without doubt our rarest swallow. It is a regular summer visitor, which frequents the same localities as the bank swallow. On several occasions we observed it to enter holes in banks, not far from one occupied by a kingfisher, but nothing certain could be found out as to whether it had been breeding or not. The time was early in June, when it should be ready to breed, and a pair was noticed in the same locality for a few consecutive weeks. Unlike the preceding species, this is not at all social, and it is never seen in large communities. It may be observed from April 19th until the middle of September. There is nothing peculiar in its notes.

Piranga erythromelas (Viell.). Scarlet Tanager.

This elegant bird arrives here usually about the beginning of May. It is generally distributed over the country in woodlands, and frequents preferably the tops of trees with thick foliage. The usual notes are some kind of a chirp, besides which it has a few whistling notes, not very loud, but quite pleasant to the listener. Nevertheless, as the bird is of a quiet disposition, it does not make much use of its capabilities as a singer.

Although a regular inhabitant of our woods, it does not seem to be abundant anywhere. It is of a solitary disposition, and notable for its neglect to seek the company of others, even of its own kind. Towards the end of August it prepares to leave this region, and so regular is its migrating that we have thus far failed to find even a single individual as late as the 1st of September.

Piranga rubra (Linn.). Summer Tanager.

This Tanager, better known under the name of "Summer Redbird," is much rarer than the "scarlet tanager," as well during the period of migration as throughout the summer. It arrives here about the second week in May, or a little later than the "scarlet tanager." Early in September it leaves us, and

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the 5th of that month is the latest date at which the writer has seen specimens. Those have always occurred to us in woods, where it frequents the tops of trees much after the manner of the other tanager. Its song possesses some peculiarly strange notes, which attracted my attention before the bird had ever been within reach of my sight.

Spinus tristis (Linn.). American Goldfinch.

This one of our resident birds is common alike in summer and winter, nor did I ever notice that during the time of migration their numbers were greatly increased, as is the case with many of our other birds. The species almost always collects in flocks, especially during the colder season, when it often accompanies the snowbird, and other sparrows in running over the ground after food, or in hanging to stalks of weeds while searching for seeds. In winter it shows a decided fondness for the fruits of the common alder. When on the tree, the individuals sit so close together that at one time, much to my regret and surprise, at a single discharge of my gun, five birds fell to the ground, notwithstanding the fact that my gun was charged with only a very small load of shot. It flies very singularly, in curved, or. more correctly, undulating lines, up and down, every now and then uttering its well-known notes, which sound like "Doo-i," the syllable "i" being accented.

The nest is cup-shaped, very neat looking, and placed not far from the ground on a small tree. The eggs are usually five in number, and of a whitish color.

The plumage of the male, as is well known, undergoes considerable change early in the fall, notably in September. Several names have also been applied to the bird, such as Thistlebird and Yellowbird, but "Wild Canary" is the one under which it is best known by our farmers and other people.

Poocaetes gramineus (Gmel.). Vesper Sparrow.

The "Grass Sparrow," as this species is commonly called, has been observed by the writer from early in March (3d) through

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the summer until late in the fall, but it is not at all as abundant during summer as it is in the spring, especially in April and the greater part of May, the majority evidently go northward; Maryland and Virginia being about the southernmost breeding-places. This species probably also winters here, since we have obtained a specimen as late as the 6th of December. This, however, seems to have been an exceptional instance, as the species has never been observed by us at a later date, although it has been eagerly looked for, and this bird is easily enough observable at any moderate distance. Grass and clover fields are its favorite haunts, as also grassy sloping banks along railroads. It prefers to keep to the ground and is hardly ever to be seen perched on trees, but when exceptionally met with there, is never perched at any great distance above the ground.

Ammodromus savanarum passerinus (Wils.). Grasshopper Sparrow.

Of our Sparrows proper, this is without doubt the least abundant species. In fact, as far as the immediate vicinity of this city is concerned, it can by no means be called an abundant bird. It has been observed by us from May throughout summer until October, frequenting the fields and pastures, and running on the ground like the grass-sparrow. Now and then it mounts a fence or some small bush, but it prefers to stay on the ground. With regard to the name, it is better known as the "Yellow-winged Sparrow," which has been used to designate it by all the earlier ornithologists.

Ammodromus maritimus (Wils.). Seaside Sparrow.

This is the only species in the present list that I have not observed alive. One specimen was collected some five or six years ago on Miller's Island, by the late Mr. Wolle, Sr., at whose house I had the opportunity to examine the bird before it was mounted. As it was unknown to Mr. Wolle, who had handled so many of our birds, I was led to the conclusion that it is a rare visitor in this section of the country.

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Melospiza fasciata (Gmel.). Song Sparrow.

This species may be found the whole year through. As far as my observations extend, its numbers do not decrease in winter even if the weather should be severe. It frequents the borders of various bodies of water, both great and small. Especially during winter it may be found in swampy spots overgrown with reeds, shrubs and small willows. During that season it may also be found associated with the snowbird and other small birds, congregating in flocks, running on the ground like little mice, and busily engaged in searching for food. As a singer it is not surpassed by any of the other sparrows. During the whole year, not excepting the cold season, its pleasant notes may be heard. The strain is usually as follows: three or four distinct moderately high notes, often embellished by grace notes, followed by a lower note, which is given forth with a peculiar squeaky twang not in accord with the rest of the song, and succeeded by a very high trill, which is finished with a still higher note.

The nest is usually placed on the ground, and it is composed of grass, the inside being lined with horse-hair, in which are placed four or five eggs, thickly spotted and blotched with brown.

Spizella pusilla (Wils..) Field Sparrow.

This little sparrow remains with us in small numbers throughout the winter, but the majority of specimens leave about the month of November upon the approach of severe weather, while in the month of March its numbers may be seen to increase. During summer it is distributed everywhere excepting in the woods, and it is not confined, as its name implies, to the fields.

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It may be found along the roadsides as well as in the hedgerows and bushes, and often perched on a tree or telegraph wire, which latter seems to be one of its favorite resting places. There it utters its few simple notes in a rather faint and high-pitched tone, differing entirely from those of the song sparrow. The nest is chiefly composed of fine grass stems, lined with horse-hair. The eggs are white, usually tinged with green and spotted with rusty brown.

In January last the writer obtained one specimen which was partly an albino. The top of its head, some of the larger and smaller feathers of the wing coverts and a few of those on the back and in the tail were snow-white. No definite pattern of color was here observable, but the markings were irregularly distributed over the upper part of the body.

Spizella socialis (Wils.). Chipping Sparrow.

This lovely little species is quite as common as the field sparrow. It arrives here in March and remains throughout October. According to my own observations it does not winter here, since the most eager search has failed to yield me a single specimen during that season. This bird is more familiar and attached to man than any of our other species. While there are others which live in as close proximity to houses, and still others which lose their shyness when driven by hunger, our bird may be seen at excursion resorts and picnic grounds hopping around our feet searchiug for crumbs without showing the least fear, and this it does at a time when there is plenty of food everywhere, and no occasion for the bird to abandon its natural shyness and timidity. Its song is a pleasant warble, not so faint as that of the field sparrow. The nest is composed chiefly of slender grass stems, occasionally mixed with threads, and is lined with horse-hair. We have found it on apple trees in the orchard, likewise beside the road on a blackberry bush not more than three or four feet from the ground, and once attached to a porch. We have observed the female incubating in the month of August. The eggs are usually four or five in number, of a light greenish blue

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color, blotched and speckled near the larger end with various shades of brown or dark purple, and often have small dark spots distributed here and there over most of the surface.

Pipilo erythrophthalmus (Linn.). Towhee.

About the middle of April the Towhee, better known under the name of Ground Finch, or Ground Robin, makes its appearance. The earliest date of arrival observed by me has been about the tenth of that month. From the date of its arrival, and continuing all through the summer until the time of departure, it is one of our most common birds. It occurs almost everywhere, and may be seen near hedges, along the roadside in shrubs and bushes, and in all kinds of thickets. Owing to its size, color and habits, it is well known to our farmers. Often it may be seen on the ground, like the Red Thrush, scratching up the leaves in search of food, and thereby causing a quick rustling noise, especially when several individuals have collected together. This species seems to avoid the depths of the woods. The nest is placed on the ground, and appears rather large and slovenly looking. It is built chiefly of fresh grass-stalks, the outside, excepting the lowest part, being composed of various dry leaves, with the thin, flexible stems, sometimes a foot in length, woven into the grass-stems, which give the outside a coarse appearance, and especially as the nest is surrounded by dry leaves. Oak leaves seem to be the kind which it prefers for that purpose. The eggs are rather large, of a whitish ground color, blotched, speckled, and spotted all over with reddish brown, but more closely so near the larger end. Between the darker blotches there are also some faint lilac spots, which may be seen by close examination. The usual number of eggs seems to be five. A nest was found by the writer on the fifteenth of August, in which were three newly hatched young ones, which could hardly have been more than one or two days old. These, we are quite confident, must have belonged to a third brood. The smaller number of eggs represented by these young birds may be accounted for by the lateness in the season. This nest was situated in a small bush, not, as usual, on the ground.

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The usual notes are "Tow-hee," uttered sharp and distinct, and with the second syllable accented. Besides this note, the bird gives forth another quite pleasant little strain, which may be imitated by the syllables, "Dya-dee-didrr."

During the latter part of October the Towhee leaves for a more pleasant temperature, so that by the first of November the writer has always failed to discover it. It seems doubtful that this species ever winters in this latitude, as has been asserted by several observers.

Cardinalis cardinalis (Linn.). Cardinal.

This dignified and brilliant colored bird stays in this region throughout the year, and it is just as common during the winter as in the summer. While being one of our most conspicuous in summer, it is even more so in winter, when the leaves no longer cover the trees. It is distributed almost everywhere, excepting in the fields and higher woods, but it also ventures to appear around the farm-house, and is quite familiar to the country people, who call it by the name of "Red Bird" in preference to that of Cardinal. The bird is usually found in pairs, and even in winter the writer has rarely seen one flying into a bush or thicket that has not been followed by a second individual. At such times it utters a peculiar call which sounds like "zeett," and this call may be heard at all seasons of the year. Besides the above cry, it gives forth a fine song, which may be heard from early in March until the close of summer, and during all this time it is a most indefatigable songster, repeating its strains at frequent intervals.

The nest is placed in small trees, besides bushes and brambles. It is made of fine rootlets, bits of weeds and strips of the bark of grape-vine. Its eggs are whitish, and marked with various shades of brownish.

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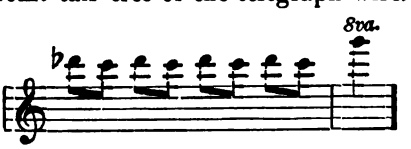
Passerina cyanea (Linn.). Indigo Bunting.

The "Indigo Bird," as this is commonly called, arrives here early in May; it is consequently one of the later birds in its return. All through the summer it is a most abundant songster, and in the autumn we have observed it as late as the 5th of October. While resident here it chiefly frequents the borders of woods, but it may also be seen on trees and shrubs next the roadside, or near the buildings on the farm; at other times it likewise perches on the wire of the telegraph lines. From its color and habit of remaining unconcealed it becomes well known to our farmers, who call it by the name of "Little Blue Bird." This bird has a very pleasant little song, which suggests the syllables "Di-a," repeated four or five times, and finished with a high-pitched but not sharp note. This song is renewed with great persistence, while the bird rests fully exposed to view on the branch of some tall tree or the telegraph wire.



The nest is placed on a bush, not far from the ground. One nest was found by the writer on a small sassafras tree, about four feet from the ground, which was suspended by three twigs. It is built chiefly of grass, sometimes with pieces of rags on the inside. The eggs are white, with a bluish tinge. A nest was found by me as late as second week in August, in which were three young birds, probably not more than two or three days old. Returning to the nest shortly thereafter the young ones were absent, although they could hardly have been old enough to fly.

Spiza americana (Gmel.). Dickcissel.

The neighborhood of Baltimore does not seem to be one of the favorite localities for the residence of this bird. Although there are times when it appears to be rather common here, at other times we have been unable to detect a single specimen, even in places where it was previously to be found, and where

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no marked changes had taken place in the character of the country. This plain, but neat-looking bird selects grassy places and the borders of fields near roads, and there it may often be seen perched upon a fence, pouring forth its song of simple notes. It arrives here about the second week in May, and generally leaves during the latter part of September. We have observed a single specimen as late as the second day of October. It may also be mentioned that this bird is better known here by the name of "Black-throated Bunting."

Molothrus ater (Bodd.). Cowbird.

Early in April, or about that time, the "Cowbird" makes its appearance, but it does not seem to be abundant near Baltimore; and especially throughout summer it is only occasionally to be seen. During the fall, however, particularly in October and part of November, it appears quite common; frequenting the same localities and spots as the swamp blackbird. It may be seen flying to and fro over the marshes in the same manner as that species, in small flocks, and often associating with it and the "Rusty-wing Blackbird."

On one occasion, with one load of shot, we brought down a cowbird, blackbird and a rusty blackbird.

Its curious habit of laying the eggs in the nests of other birds, is so well-known that it is hardly worth while to reiterate it here.

It leaves this region about the middle of November, and the writer has never observed a single specimen at a later date. Its note is peculiar, forming a long-drawn whistle, rather high pitched.

Agelaius phoeniceus (Linn.). Red-winged Blackbird.

It would seem that there is hardly a bird better known by everybody, and particularly by our gunners, both young and old, than this "Blackbird," not even excepting the Robin and Bluebird; nevertheless, it is frequently confounded with the "Rusty-winged Blackbird," and even with the "Cowbird." Although the bird is seen throughout the whole year, yet a vast difference appears in their numbers according to the season.

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As early as February, flocks of those which had left in the preceding fall make their appearance, in numbers constantly increasing as the season advances, especially during March and April; but as May approaches, it ceases to gather in flocks, because the time for nesting has arrived. But it is not until the later part of August, when the "wild oats" *Zizania aquatica* begins to ripen, that its numbers are again seen to increase. By September and October its flocks, augmented by the young ones, become actually incalculable, as may be seen by anyone who will visit at that time the "Back river," or the "Patapsco." In November its numbers gradually decrease. But throughout the winter we may observe small flocks, or sometimes a solitary specimen, in secluded or sheltered places. Most of those that we have obtained and observed during winter were young birds, particularly those which were solitary.

Its usual note is a well-known cluck, delightful only to the gunner; but it has, besides, a few pleasant notes which, sound like "Cong-ter-ri," each syllable of which is uttered distinctly, but rapidly. In spring, particularly, these notes may be heard, but not only during that season, since in the cold weather of mid-winter we have occasionally recognized them.

Sturnella magna (Linn.). Meadow Lark.

This bird, which is usually called "Field Lark," stays in this region throughout the entire year. During summer it is evenly distributed all over the country, frequenting fields, meadows, pastures and similar places. In the fall, particularly in November, and even the greater part of winter, it collects in flocks of not very great number. Whether flying or on the ground, the individuals keep together, but not closely. When disturbed, the scattered flocks move off quite simultaneously. During the latter part of fall, and also during winter, it appears much more common in the immediate vicinity of the city than during the summer months.

It almost always keeps to the ground, where it runs about with great ease, while it is well protected by the color of its plumage, especially when the grass and weeds are bleached, so

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as to give the grayish and brownish tints, which well agree with the upper surface of the bird.

A nest now before me, obtained the latter part of June, is composed mainly of grasses, fine rootlets and feathers of the turkey. It was found, as is always the case, on the ground, and was partly arched over.

The eggs, three in number, are much smaller than the ordinary average size for such birds, and their color is whitish, speckled with purplish-brown, more thickly near the larger end, but sparsely near the middle and smaller end.

It gives forth a very pleasant song, but not strong when we consider the size of the bird.

During winter it is comparatively mute, and so continues until about April, when its well-known notes are again echoed through the air.

Icterus spurius (Linn.). Orchard Oriole.

The "Orchard Oriole" arrives here early in May, and stays all through the summer. In September it departs, rather early, long before the majority of our other songsters are ready to leave. During its stay, this bird is particularly fond of the orchards, whence its name, but it also frequents other cultivated places. The writer has also observed it along the roadside in bushes, shrubs and small trees.

It is not uncommon in various places, but is hardly entitled to be called abundant in the strict sense of the word.

It is difficult to give an adequate idea of its notes, by either words or syllables.

Icterus galbula (Linn.). Baltimore Oriole.

This beautiful bird, notwithstanding its name, is not a common summer visitor; at any rate, it is less common than the Orchard Oriole. It is evidently partial to certain districts, while it shuns others, and therefore is not equally distributed over the country. We may remark incidentally that the original Latin name bestowed upon it by Linnæus did not refer to the city of Baltimore, but to the heraldric colors of Lord Baltimore.

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The Oriole arrives here early in May, and is then for a few weeks rather common, much more so than during summer. It frequents shady trees, often near the farm house, showing a fondness for the neighborhood of man, and during migration especially is not unfrequently seen even in the larger parks and cemeteries of the city. It leaves this neighborhood rather early in September.

The nest is pensile, more or less a pouch-like structure, composed of all possible kinds of soft material, almost artificially woven together. The eggs are of a whitish ground color, marked with dark so-called pen lines.

The song is a rather soft whistle, quite pleasant to hear; often uttered as the bird hops to and fro among the branches of the tree.

Quiscalus quiscula (Linn.). Purple Grackle.

The "Crow Blackbird," as it is commonly called, arrives here about the third week in March. It is a very common bird during summer, particularly in and near cultivated places, and frequenting parks and open places in the city. For several consecutive years we have observed this bird to be a regular visitor of the Greenmount Cemetery, from the latter part of March nearly through August, when it disappears. Early in April it is seen building rather bulky nests on the large trees which adorn that cemetery. From there it makes excursions into the surrounding fields, pastures and waste places, strutting about in a manner betraying its resemblance to the crow.

The usual call notes are almost the same as those of the common blackbird.

Towards the close of fall it departs for the south.

Corvus americanus (Aud.). American Crow.

Our "Crow." is such a common and well known bird that it is well nigh useless to offer any remarks concerning it. It is seen to be a resident, plentiful in summer as well as in winter,

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frequenting localities of all descriptions, now running over some cultivated field, then gathering upon some swampy, muddy shore, or along the road.

The crow builds rather early. The nest is a somewhat course and rough looking structure, situated usually at a considerable distance from the ground, on a tree, very often of the pine species. A nest with three nestlings almost ready to fly was obtained by the writer early in May.

A well known fact is their gathering in immense numbers at certain roosting places, in tracts of woods, from whence they start regularly in the morning, and return in the evening, always flying in a particular direction.

Cyanocitta cristata (Linn.). Blue Jay.

This fine and stately-looking bird is likewise a resident, but its numbers vary somewhat according to the season. Both in the spring and in the fall it is exceedingly common in the immediate vicinity of the city, particularly during October and the greater part of November, when it gathers in small flocks, flies from tree to tree, and is readily recognized by the screeching notes. But during summer, and still more during winter, it retires to the depths of the woods and to the interior of the country, so that hardly any are to be seen within a few miles of the city. In the month of July, while traversing the woods along the middle Patuxent river, the writer never before saw so many gathered together, hovering between the gigantic trees which border both sides of that river.

The usual notes of this bird are of a rather crying and screaming character, and far from pleasant.

When assembled together their screaming sometimes becomes rather annoying. But besides this unpleasant screaming, the Jay possesses a few notes so plaintive, and so at variance with the vivacity and boldness of the bird, that we could hardly believe the

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fact when these notes were heard for the first time. The sounds consist mainly of two notes, a small third apart, uttered slowly.

The Jay possesses, likewise, courage and boldness, in which qualities it is hardly exceeded by any of our other birds. The writer has observed on one occasion a Jay to attack a bird which appeared to be a Red-shouldered Hawk, and which it succeeded, by persistent onsets, in driving away.

Tyrannus tyrannus (Linn.). Kingbird.

This bird makes its appearance about the twentieth of April. It is one of our most abundant birds during the whole summer, but leaves us again rather early in September. The bird may be found everywhere except in heavy woods; it particularly loves pastures and fields covered here and there with some tall weeds and plants, upon which to rest. It is also found near the farm house, along the roadside, often sitting on telegraph wires in company with others of its own kind. The bird is very bold and aggressive, attacking other birds much larger than itself, thus giving force to both its common and Latin names, as also to its former specific name, "*intrepidus*."

From its habit of catching bees, it is called "Bee Martin," which, in fact, is the only name given to it by our farmers. From this propensity to catch bees, this bird is very much disliked by country people.

The nest is rather bulky, not very neat, made of rootlets, as also of parts of grape vine bark, and it is lined with grass. The eggs are whitish, with spots of chestnut and lilac gray.

The bird has no particular utterance or notes, save a sort of twitter.

Myiarchus crinitus (Linn.). Crested Flycatcher.

Late in April this bird, the largest of our flycatchers, makes its appearance, and it departs again about the 20th of September. It frequents mostly shady woods, and is hardly ever seen near houses and on the farms. Its note is nothing but a squeak, very different from the utterances of our other flycatchers, being low, and frequently heard when the bird is perched at the top of

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some tall tree. In September it apparently becomes mute. It is not uncommon, and it is generally distributed all over the country in suitable localities. Unlike the "Kingbird" and our two Pewees, it is hardly known to our farmers, notwithstanding its conspicuous size. It is always solitary, and does not appear to seek the company even of its own kind.

Sayiornis phœbe (Lath.). Phœbe.
"Pewee."

Setting aside the Bluebird and the Robin, both being seen occasionally, if not regularly during winter, the "Pewee" must be considered as the pioneer of all the birds in spring; it is truly a harbinger of spring. Early in March it arrives in this latitude, and is during that month and part of the following one very abundant, until the arrival of the "Wood Pewee," when it becomes outnumbered by that species. At this time also a large number evidently go farther north. All through the summer, even though common, it is not as abundant as the Wood Pewee. In the fall, particularly in October, it again becomes extremely abundant. It remains nearly through October, and we have observed it besides early in November. It is particularly fond of the neighborhood of water, and the writer has often observed it flying above the water, almost skimming it; somewhat after the manner of swallows, particularly in the spring.

Its notes are indicated by its vernacular name, and they are mostly heard in spring, uttered when sitting on some limb or branch of a tree, but sometimes while perched on a fence-rail. The notes sound like the syllables, "Pa-way."

Contopus virens (Linn.). Wood Pewee.

The Wood Pewee arrives in this neighborhood about the 25th of April, stays here through September, and leaves again in October. It is an exceedingly common bird all through the summer, much more so than the true Pewee. It frequents woodlands, also orchards and other similar localities, particularly during the breeding season, where it usually occupies the branches having none or hardly any foliage; seemingly as if

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the bird intended to have a full view of all that is going on. There we hear its plaintive notes, rather different from those of the Pewee proper, throughout most of the summer, and occasionally even in September. The notes are "Pee-a-wee."

It breeds as well in the depths of the woods as in the orchards. The nest is an exceedingly beautiful structure, round, almost circular, made mostly of soft material of various kinds. The outside, which indeed gives the nest its beautiful appearance, is covered with bluish-gray lichens. The nest is always, as far as we have had occasion to observe, saddled on the branch of the tree, which consequently gives its lower part a very decided indent. It is sometimes attached in the orchard to an apple tree, probably eight or ten feet from the ground. One was obtained by the writer from a tree where it was situated at a height of at least twenty-five feet from the ground. The eggs are four or five in number, with dark brownish spots, some of which are placed like a ring around the larger end. We have found a nest late in July with eggs upon which the birds had not yet begun to incubate.

Empidonax acadicus (Gmel.). Acadian Flycatcher.
Small Green-crested Flycatcher.

This flycatcher, by its greenish color, is easily distinguished from the rest of the "Tyrannidae" inhabiting our woods during summer. It arrives from the South about the first week in May. It is moderately common all through the summer, frequenting only shady woods, and preferring usually the lower parts of the trees, and not seeking disguise in the foliage, as if conscious of the protection afforded by its color. It seems to be of a rather solitary nature. Toward the close of September it departs to seek a more congenial climate for its winter home.

This bird is entirely destitute of song or anything which might be so designated. Only a squeaky note, rather loud for the size of the bird, is heard occasionally, which betrays the bird, as we pass through the woods. When driven away by a stranger it does not fly very far, but soon alights on some bough of a tree near at hand.

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LIST OF GENERA AND SPECIES.

1. Turdus mustelinus.
2. Turdus unalascae Palasii.
3. Merula migratoria.
4. Galeoscoptes carolinensis.
5. Harporhynchus rufus.
6. Sialia sialis.
7. Parus bicolor.
8. Parus carolinensis.
9. Sitta carolinensis.
10. Thryothorus ludovicianus.
11. Troglodytes aëdon.
12. Cistothorus palustris.
13. Mniotilta varia.
14. Helmintherus vermivorus.
15. Dendroica aestiva.
16. Dendroica discolor.
17. Dendroica vigorsii.
18. Seiurus aurocapillus.
19. Seiurus motacilla.
20. Geothlypis trichas.
21. Icteria viridis.
22. Sylvania canadensis.
23. Setophaga ruticilla.
24. Vireo olivaceus.
25. Vireo noveboracensis.
26. Vireo flavifrons.
27. Ampelis cedrorum.
28. Chelidon erythrogaster.
29. Tachycinetta bicolor.
30. Progne subis.
31. Petrochelidon lunifrons.
32. Clivicola riparia.
33. Stelgidopteryx serripennis.
34. Piranga erythromelas.
35. Piranga rubra.
36. Spinus tristis.
37. Poocetes gramineus.
38. Amodromus savannarum passerinus.
39. Amodromus maritimus.
40. Melospiza fasciata.
41. Spizella pusilla.
42. Spizella socialis.
43. Pipilo erythrophthalmus.
44. Cardinalis cardinalis.
45. Passerina cyanea.
46. Spiza americana.
47. Molothrus ater.
48. Agelaius phoeniceus.
49. Sturnella magna.
50. Icterus spurius.
51. Icterus galbula.
52 Quiscalus quiscula.
53. Corvus americanus.
54. Cyanocitta cristata.
55. Tyrannus tyrannus.
56. Myiarchus crinetus.
57. Sayiornis phoebe.
58. Contopus vivers.
59. Empidonax acadicus.

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THE YELLOW-HEADED BLACKBIRD "XANTOCEPHALUS XANTOCEPHALUS" (BONAP) IN MARYLAND.

By ARTHUR RESLER.

Through the courtesy of my friend, Mr. Otto Nickel, to whom I am indebted for several rare birds in my collection, I have received a freshly killed specimen of the above named bird.

It was obtained September 10th, near Curtis Bay, in Anne Arundel County, about three-quarters of a mile South of Baltimore City.

Since this species has only been observed rarely and casually in the East United States, and never to my knowledge in Maryland, it seems to me worth while to record the capture of this bird.

Although my specimen agrees pretty well with the descriptions given by Baird, Ridgway and others, a further account of its characteristics appears to be desirable. The head and neck are dirty yellow, and most of the feathers have blackish tips; this feature, *i. e.* the darker tips, is characteristic of the winter plumage. The whole space between the bill and the eye, as also below and partly around the eye is black. The lower eyelids are yellowish. The throat and breast are yellow, but the posterior border is not abruptly separated from the black abdomen, since some of the yellow feathers have black tips, and besides have the appearance of being barred. There is also a somewhat concealed yellow spot near the anus. The feathers of the lower end of the thigh are likewise more or less yellowish. The remainder of the body is black, with the exception of a very conspicuous white wing-patch, which is divided by a black bar, consisting of the black and partly black feathers of

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the alula, *i. e.* the feathers of the thumb. Also the white feathers of this wing-patch, have black spots near their tips.

The bill and feet, including the claws are black, the latter are very long and exceedingly curved, especially on the hallux. Eyes are brownish. The tongue is yellowish at tips, with the larger middle part black, while the posterior border, which is provided with strong somewhat curved papillae, is reddish, like the rest of the mouth-cavity, because of the absence of pigment from this part of the surface. Length 9½ inches.

APOPHYLLITE FROM NEW ALMADEN QUICKSILVER MINE, CALIFORNIA.

By CHRISTOPHER JOHNSTON, M. D.

In the early part of August 1891, I wrote to Dr. D. T. Day of the U. S. Geological Survey, Washington D. C., for a piece of Apophyllite which he might have secured. After a few days a note came to me announcing the sending of a box by Adams Express containing all he had of a small collection which had been made in California, requesting me to take what I needed and send the balance back. Upon opening the box I discovered a quantity of indifferent rock cemented here and there by a grayish opalescent and transparent crystalline substance which was the Apophyllite in question. I soon cleaned away the rubbish, isolated a dozen, or thereabouts, of milky and clear crystalline pieces about five-eighths of an inch in width and seven-eighths in length, some of this size and some smaller, split off with a knife what seemed best suited for specimens, ground some of the fragments and polished them, and then proceeded to examine them with a Nær-

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remberg's Polarizer. The thinner sections were quite blue; but those of a thickness of one-sixteenth of an inch, gave in the polarized field a black cross with a system of rainbow rings beginning with blue in the centre surrounded by a yellow, then a red, then a pale green ring which was lost in the margin.

I was surprised at the difference presented between what I saw and the usual whitish ground with a black cross and rings tinged a pale yellow. Referring to Tait (Light) I found that Dispersion has been accounted for by the different speeds of light of different wave-lengths in the same refracting medium;—this being a consequence of ultimate grained structure of ordinary matter which is on a scale not incomparably smaller than average wave-length. But the colored rings themselves remained.

At this juncture I prepared and sent specimens of the find to Dr. D. T. Day, Prof. C. S. Hastings, Dr. Steeg of Hamburg, and Dr. Williams of the Johns Hopkins University. A short time thereafter a letter was brought to me from Dr. Steeg pointing out that the Apophyllite I sent him possessed a dispersion quite different from Apophyllite found in other places. The ring system of this Apophyllite is similar to that of the Subsulphate of Strontium, and is optically *negative* while all other Apophyllites are *positive*. This indication can be beautifully demonstrated by means of the Calkspar-wedge, "C No. 47 of our Catalogue." Calcite is termed the *negative crystal* because the extraordinary ray is less refracted than the other, or the axial elasticity is the greatest; while the other class are termed positive (Lewis Wright).

Apophyllite, says Wright, is remarkable for the fact that it is "positive" for one end of the Spectrum, "negative" for the other, and non-doubly refracting for some intermediate color, generally yellow. Hence we have instead of rainbow circles, as in most cases, rings nearly white and black: the usual effect being black rings lined, as

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it were, with green only. We have here, therefore, a phenomenon of another kind due to "anomalous dispersion."

In all previous apophyllites, it would therefore seem that the dispersion conforms to the positive end of the Spectrum and the rings are *black lined* with *greenish yellow;* whereas in the present case we have another sort of effect, a black cross and *Rainbow Rings.* For my part says Hastings, it seems extremely difficult to imagine how the habit of a crystal could be so completely changed.

Dr. Steeg suggests that we might find in the chemical composition of the Apophyllite from the New Almaden Mine, an explanation of its optical properties. Thus the analysis of the Older Apophyllite as given by Dana 16: Edition 1891, is

Silica - - - -	52.97
Lime, - - - -	24.72
Potass, - - -	5.20
Water, - - - -	19.50
Fluorine, - - -	2.10
	100.89

A silicate; but to establish comparison, Dr. David T. Day undertook to have an analysis made in the U. S. Geological Department. This he will do immediately.

To sum up, therefore, we have in the Apophyllite of the New Almaden Quicksilver Mine, a new sort of Apophyllite, or at all events, one now mentioned for the first time.

BALTIMORE, OCTOBER 1st, 1891.

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REMARKABLE NEW HOMOPTERA.

By P. R. UHLER.

Subfam, ISSIDA, Stål.

TICIDA. New gen.

Allied to *Acrisius* Stål, but having a series of four small spines on the posterior tibiae. Form obovate, moderately depressed, not recurved at tip of abdomen. Vertex short, subquadrate, triangularly emarginate both in front and on the posterior margin, the lateral edges and middle line carinately elevated, with a transverse sunken area behind the vertex proper, in the outer angle of which the ocellar tubercles are placed, and the basal margin of this area is strongly arcuate-carinate, the occipital space behind this forms a deeply sunken collum. Eyes large, prominent, almost spherical, somewhat emarginated on the inner border. Front moderately narrow, composed of two tablets, the upper one longer than the lower, feebly bowed on the lateral, elevated margins, the middle line widely and deeply sulcated, with a stout double carina running down the length of the groove, and becoming single upon the lower tablet, this lower division thus becoming five-carinate, but the two intermediate carinae are arrested below, and leave only three on the clypeus; the clypeus as wide as the front, and becoming spatulate below. Pronotum very short, depressed, carinate on the middle, a little produced into a wide area on the middle of the anterior margin, each side of which it is broadly sinuated, the lateral margins almost acutely oblique. Scutellum large, wider than long, with the lateral angles particularly acute.

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Hemelytra thick, scarcely reaching beyond the middle of the abdomen, truncated behind, the principal veins very prominent, straight, evenly forked behind, the space between filled with slender, serially arranged reticulated cellules.

T. *cingulata*. New sp.

Broad obovate, fusco-cinereous, pointed with fuscous, partly sunken dots over most of the upper surface, pale testaceous beneath. Vertex greenish testaceous, with a dark brown band occupying the basal sulcus, anteriorly the fuscous dots begin in a triple series and continue down each side of the front in a double series, as far as to the end of the upper division, at this point a broad, black, band crosses the face and extends upon the side of the prostethium where it terminates in a large, highly polished, tumid area; clypeus flesh colored or testaceous, with a black band next the tip; tylus carinate, greenish, having a fuscous dot each side, the rostrum more or less infuscated. Pleural flaps testaceous, dotted with fuscous, the adjoining sternal pieces tinged with orange, and the epipleurae marked with black bars. Legs long, stout, grayish testaceous, the coxae testaceous, the anterior pair barred with black; femora more or less cinereus, the anterior and middle pairs with two obscurely defined fuscous bands, the posterior pair irregularly infuscated, all clothed with yellowish pubescence, tibiae dull testaceous, obscurely banded with fuscous, except the posterior point, spines piceous. Pronotum dull testaceous, rather evenly dotted all over with fuscous varioles, and with a pale brown carina on the middle. Scutellum broadly testaceous and smooth on the disk, carinated, dotted with fuscous near the outer angles, the apex subacute and dark piceous. Hemelytra brownish gray, or flavo-testaceous, crossed by a broad white band on the apical border, the exterior corner of which is maculated

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with fuscous, interspaces of the veins and some obscure basal spots fuscous. Tergum dull yellowish or greenish testaceous, having a broad fuscous band at base, and interrupted fuscous lines and dots on the sides and apical segments; venter pale testaceous, more or less inscribed with fuscous.

Length to tip of venter three and a half to four millims. Breadth of pronotum two millims. Breadth of abdomen two and a half to three millims.

Only three specimens, all males, of the brachelytrous form, have been reported. These were obtained by Mr. Coquillett in Los Angeles County, Cal.

It will be of much interest to secure the macropterous form of this fine insect, as until that is obtained no full diagnosis of the perfect venation of the genus can be given.

BELONOCHARIS. *New gen.*

Closely related to *Scolops* Germ, and with the same kind of cephalic prolongation, but is a much more delicate type of insect. Macropterous form having the hemelytra very tender and nearly twice as long as the body; with the body depressed and subovate. Head narrow, the cephalic stylus very slender, curved upwards, but little widened at base, the vertex narrow, oblong, tumid, excavated behind, but little wider than the base of the stylus; front oblong, with carinate margins and three approximate carinate lines along the middle; clypeus longer than the front, spatulate, carinate on the middle line; rostrum reaching to near the tip of the venter. Anterior pair of femora lamellate with the margins curved and a carina along the middle; posterior tibiae slender, armed with a series of six short spines. Pro-

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notum about half as long as the scutellum, excavated in front to correspond with the excavation of the head, and with the margins of the excavation prominently elevated and produced, basal margin concave, waved, emarginated and depressed in the middle. Scutellum large, convex, broadly excavated along the whole length of the disk, the excavation narrowed at tip, and with its lateral margins carinately elevated. Hemelytra opaque, membranous, veins slender, few, straight and regular, the exterior ulnar vein is forked behind the middle and its two branches fork again at tip, the interior ulnar vein forks only next the middle of the wing-cover, a few travsverse veins cross the apical areole and apex of the post-costal space.

B. *fumida*. New sp.

Macropterous form narrow and long, piceous black, shining, with the hemelytra and wings translucent, smoke blackish and the veins deep black. Cephalic stylus slender, testaceous, blackish at base, and with the longitudinal groove blackish. Eyes prominent, dark brown, the face and pleural pieces piceous black; rostrum greenish testaceous, with the setae piceous. Vertex shining black, with a tabulate almost flat, oval disk, whlch is followed behind by a sunken space concurrent with the excavation of the apex of the pronotum. Antennae stout, black, the setae about as long as the eye. Pronotum polished black, the middle line, anteriorly, raised in a thick carinate line. Scutellum large, wide, dull smoke blackish, with the convex outer sides polished black, Legs smoke brown, the anterior and middle thigh and tibiae marked with two obscure blackish bands wing-covers and wings paler smoky blackish, with the coarser veins of the former obscurely interrupted with pale piceous. Ventral surface dull smoke brown. Length to tip of hemelytra seven and a half millims. Width across the base of

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hemelytra two and a quarter millims. Length of cephalic stylus scant two millims.

Only males have thus far been examined. This insect closely resembles some of the black forms of the Phryganid genus *Leptocerus* Leach, with which it might readily be confused, but the curved stylus projecting from the head will at once show the hemipterist that its affinities are with the homopterous genus *Scolops* Germ, next to which it should be placed in a natural arrangement.

It was captured in Los Angeles, County, Cal. by Mr. D. H. Coquillett, and should be placed to the credit of the Division of Entomology of the U. S. Bureau of Agriculture.

PRELIMINARY SURVEY OF THE CICADIDÆ OF THE UNITED STATES, ANTILLES AND MEXICO.

By P. R. UHLER.

SELYMBRIA Stål.

S. *modesta* Dist. Biol. Cent. Amer. Homopt. p. 14. One specimen from Orizaba, Mexico, Mr. Distant reports specimens from Mexico and Nicaragua.

TYMPANOTERPES Stål.

T. *gigas* Oliv. (Cicada) Enc. Method, v, V., p. 750, No. 15, tab. 3, fig. 4. *Cicada triupsilon* Walk. Brit. Mus. List. Homopt. I., p. 103, No. 2. *Cicada sonans* Walk. ib. p. 104, No. 4. *Cicada consonans* Walk. ib. p. 106, No. 7. *Tympanoterpes sibilatrix* Berg. Hem. Argent p. 210, No. 252. *Tympanoterpes gigas* Dist. Biol. Cent. Amer. Homopt. p. 14.

Jan. 20, 1892.

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I have examined specimens from various parts of Mexico, and from Guatemala, Panama, Guiana, and Matto Grosso, Brazil. Specimens from Tamaulipas, Mexico, differ in no respect from others living farther South, although the species is a very variable one, especially in the amount and form of black marking on the upper surface of the body. The region of the Rio Grande of Texas is the most northern limit of this species, while the northern part of the Argentine Republic seems to be its most southern habitat. By including Trinidad in the Antilles, Mr. Distant unites the West Indian Fauna with the South American, but as this species has not been found to inhabit the true Antilles, such as Jamaica, Cuba, San Domingo or Porto Rico, we are not justified in referring it to the Antillean region, which has other forms peculiarly its own.

FIDICINA Amyot and Serv.

1 F. *picea* Walk. Brit. Mus. List. Homopt. v. 1, p. 81, No. 6. *Fidicina determinata* Walk. ib. Suppl., p. 14, *Fidicina pertinax* Stål, Stettin Ent. Zeit. V. XXV. 186, p. 62, No. 389.

I have received this species from Central and Southern Mexico and from Demerara.

2 F. *pronoe* Walk. (Cicada) Brit. Mus. List. Homopt. v. 1, p. 144, No. 82. *Fidicina vinula* Stål, Oefv. Vet. Akad. Foerh. 1854, p. 242; 1862 pp. 482, 500. *Cicada compacta* Walk. Insect. Saund. Homopt. p. 14.

Specimens have been sent to me which were collected near Cordova and Orizaba, Mexico; and I have examined others from Guatemala and Brazil. A soiled specimen from Southern Texas seems to belong to this species.

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CICADA.

1 C. *tibicen* Linn. Mus. Lud. Ulr. p. 160, No. 7, Syst. Nat. 1767, p. 707, No. 19. Collinson, Philos. Trans. vol. 54, 1765, p. 65, tab. 8. Fabr. Ent. Syst. v. IV., p. 18, No. 18. Syst. Rhyng p. 35, No. 12. *Cicada lyricen* De Geer, Mem. v. III., p. 14, tab. 32, fig. 23. *Cicada variegata* Fabr. Ent. Syst. IV., p. 19, No. 10. Germar. Thon. Ent. Archiv. II., p. 4, No. 44. *Cicada opercularis* Oliv. Enc. Method, vol. V., p. 749, No. 12. *Cicada pruinosa* Say, Jour. Acad., Phila., v. IV. 1825, p. 330, No. 1.

Some observations upon this species, communicated by J. P. Wild, a German resident of Baltimore, to Mr. Becker, of Paris, have been published in the Ann. Soc. Ent. France 2d ser. Bullet. v. 10, 1852, p. XVIII., in which the name *pruinosa* is confused so as to be spelt *bruneosa*.

The descriptions given by Linnaeus are too short to separate this from several other species inhabiting the same localities with those cited by that author; so that we are necessitated to consult later German and Swedish authorities for more adequate information. Accordingly, we find by reference to Dr. Germar, in Silbermann's Rev. Ent. v. II., p. 64, that the true C. *tibicen* Linn., is the common form, which is figured by Stoll in his Cigales, fig. 13. We are also informed by the same author that the *Cicada opercularis* Oliv. was described from this figure of Stoll, and consequently that the latter name is a synonym of the Linnaean one.

The description of Linnaeus, Mus. Lud. Ulr., p. 160, embraces the characters of two or three species, one of which appears to be the C. *mannifera* Fab., but the figures of Merian, Brown and Seba, cited in the same place, represent species very different from the true C. *tibicen*. More recently Dr. Stål has examined a type of

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our insect in the collection of Fabricius, and from him I have received a positive identification of our species.

The late Mr. Francis Walker also kindly sent to me several specimens, from various parts of North America, which display a wide range of variation in the markings of the head and thorax. Individuals of this species are occasionally found which show but a trace of the brown W-shaped mark near the tip of the wing-covers. I have also examined two specimens, otherwise normal, from which this mark was entirely absent.

The same thing likewise occurs with *Tympanoterpes gigas* Oliv.; *Cicada canicularis* Harris; C. *dorsata* Say; C. *montezuma* Dist.; C. *biconica* Walk., and most commonly of all, with C. *auletes* Germ., (*marginata* Say.) The cause of this absence of the forked venal mark is not adequately known. It seems to be absent only in very few individuals of a species. Possibly, the less vigorous and sensitive condition of some individuals at the time of oxydation of the integuments hinders the complete flow of the blood to this part of the venation and fails to furnish the chemical elements upon which radiant energy acts in developing color.

2. C. *marginata* Say, Journ. Acad. Philada., v. IV., 1825, p. 330, No. 2, *Cicada auletes* Germ. Silb. Rev. Ent., v. II., p. 65, No. 26. *Cicada resh* Hald., Salt Lake Exped., p. 369, pl. 9, fig. 17. *Cicada sonora* Walk. Brit. Mus. Cat. Hom., v. I., p. 105, No. 5. *Cicada resonans* Walk. ib., v. I., p. 106, No. 6. *Fidicina literata* Walk. ib, p. 91, No. 23. *Fidicina figurata* Walk. ib. suppl. p. 19.

This large species is distributed throughout the Piedmont region of the United States from New York to Northern Florida. It is also found in the Gulf States, and spreads on through Texas, Arkansas and Missouri to Colorado and Utah.

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The synonymy given by Mr. C. W. Woodworth for this Species, Psyche, vol. V., p. 68, is without foundation. The *Cicada bicosta* Walker, Hom. p. 112, (cited as C. *bicostata* by the above writer,) does not agree with any of the varieties of C. *marginata* known in the collections, still less can the tiny C. *aurifera* Say, be included among its synonyms.

Tamaulipas, Mexico, is the most southern limit thus far discovered for the C. *marginata*. A *Cicada* with the same specific name, from the East Indies, occurs in Olivier, Encyc. Method; but it will doubtless be found to belong to some other of the oriental genera when the species shall be subjected to further study.

3. C. *canicularis* Harris, Ins. injur. veg. 1842, p. 175; 1852, p. 190; 1862, p. 217, fig. 88. Emmons, Agric. New York, v. V., p. 152, pl. 9, fig. 5.

This form has a widely extended distribution in North America. It has been found in lower Canada, and at intervals across the continent as far west as to near the Black Hills in Dakota; from this region it spreads south into Central and Western Texas, and from thence into Mexico. East of the Mississippi river it has been found in all the States from Maine to Northern Florida, and specimens have been collected in Illinois, Ohio, Kentucky, Alabama, Louisiana, Arkansas, Kansas and Missouri.

It varies considerably in size and somewhat in the amount of black ornamentation upon the dorsal surface of the thorax. In many respects it approaches the pale variety of C. *tibicen*, but it differs from that species in having more prominent eyes, in the general marking of the pronotum, narrowed vertex, and differently shaped opercula. The mesothoric cross is also narrower, and more extended transversely than in the C. *tibicen*. After a severely close comparison of more than fifty specimens

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of both these species, including both sexes, I am urged, against my former convictions, to accept this as a distinct species. A full knowledge of the life history of this insect may hereafter show that it is only a race of the former, but until such proof is adduced we are not in a position to unite the two forms in one species.

4. C. *superba* Fitch, First Report N. Y., 1856, p. 41.

This is also a variable species, in which the wing-covers are more or less suffused with brown near the tips, and the apical nervures sometimes bordered with still darker brown. It has been taken in Indian Territory, Central Texas, and in the region of the Rio Pecos, New Mexico. The structural elements agree closely with those of C. *tibicen*, and the pattern of marking is just such as we might expect to find in a weak race of the species in which the deep colors have failed to be filled out. The partial absence of dark color on the body seems to be in a degree compensated by the transfer of that color to the wing-covers and wings. Can the alkaline soils of its habitat aid in producing this modification of color in the superficial integuments?

5. C. *dorsata* Say, Journ. Acad. Philada., v. IV., 1825, p. 331, No. 3, *Cicada robertsonii* Fitch, First Report N. Y., 1856, p. 41.

This species inhabits the prairies and plains from Dallas county, Iowa, and eastern Nebraska to southern (not coastal) Texas. It is not uncommon in Colorado and New Mexico, and it extends east across the western borders of Missouri and Arkansas. Varieties of this species apparently approaching C. *marginata* Say occur in Texas and New Mexico; and a variety of the latter from North Carolina possesses many of the structural features of C. *dorsata*.

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6. C. *aurifera* Say, Journ. Acada. Philada., v. IV., 1825, p. 332, No. 4.

Not yet rediscovered, and known only from the description of Mr. Say, who captured it near the Konza Indian settlements, probably in what is now Nebraska. It seems to be a pale variety of C. *canicularis*, which inhabits that State; but the size given is smaller than that of any specimen thus far brought to our notice.

7. C. *vitripennis* Say, Journ. Acad. Philada., v. VI., 1830, p. 236, No. 3.

Mr. Say's specimen was obtained in the region of the Arkansas river, probably in Colorado. It occurs in New Mexico, northern Texas, Arizona, Louisiana and Florida. Dr. Edward Palmer captured a specimen on the shore of Biscayne Bay, Southern Florida.

8. C. *pallida* Dist.Biol. Cent. Amer, Homopt, p. 8, pl. 2, fig. 7.

This species has been captured in Mexico and central Texas. By the pallor of its colors and obsoleteness of its markings it stands in about the same relation to C. *vitripennis* Say as C. *superba* Fitch does to C. *tibicen* Linn. Both of these species will most likely be suppressed when the life histories of the forms shall have been sufficiently studied.

9. C. *biconica* Walker, Brit. Mus. List, Homopt, v. 1., p. 120, No. 57.

This beautiful West Indian form is common on the island of Cuba, and I have seen also a specimen from Mexico, and another from southern Florida. Specimens of both sexes from Cuba vary widely in the amount of marking on the mesonotum. In a female specimen from near Havana the black lobate markings of the mesonotum are entirely obliterated.

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10. C. *bicosta* Walker, Brit. Mus. List, Homopt. v. I., p. 112, No. 14. Distant, Biol. Cent. Amer. Homopt. p. 7, pl. 3, fig. 1.

Specimens cited by Mr. Distant were collected in Mexico and Costa Rica. In my own collection there is a female from Key West, Florida, captured by Dr. E. Palmer, and a male from Cape St. Lucas, Lower California, from the cabinet of John Xantus de Vesey.

From the colored figure of the Biologia and examination of my own specimens, I find a close resemblance and much agreement in structure between this and C. *biconica* Walk. The C. *bicosta* is a shorter winged and more robust form.

11. C. *montezuma* Dist. Biol. Cent. Amer. Hom. p. 8, No. 6, pl. 2, fig. 2.

This species extends from the region of San Diego, California, into Mexico, and from thence through Arizona and Texas to the vicinity of the Pecos river in New Mexico. It is quite distinct from our other native species, is apparently not very variable in pattern of marking, but it is decidedly variable in size. The great prominence of the front renders it very conspicuous.

12. C. *rudis* Walker, (*Fidicina*,) Brit. Mus. Cat. Hom. Supp. p. 13, Distant, Biol. Cent. Amer. Hom. p. 8, No. 5, pl. 2, fig. 20.

Inhabits Eastern Mexico, and is much like a fragmentary specimen in my collection from Arizona.

13. C. *crucifera* Walker, Brit. Mus. Cat. Hom. v. I., p. 196, No. 147, Distant. Biol. Cent. Amer. Hom. p. 8, No. 5, pl. 3, fig. 6.

A small, but interesting, form which has thus far been found only in Mexico.

14. C. *nigriventris* Walker, Brit. Mus. Cat. Hom. Supp. p. 21. Distant, Biol. Cent. Amer, Hom. p. 9, No. 8, pl. 2, fig. 6.

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This species closely resembles a variety of C. *canicularis* Harris, from Texas and Louisiana. The types were obtained in Mexico, and other specimens have been collected in Costa Rica.

15. C. *psophis* Walker, Brit. Mus. Cat. Hom. v. I., p, 153, No. 92. Distant, Biol. Cent. Amer. Hom. p. 9, No. 10, pl. 2, fig. 11.

Hitherto found only in Mexico.

16. C. *ornea* Walker, Brit. Mus. Cat. Hom. v. I., p. 137, No. 75. Distant, Biol. Cent. Amer. Hom. pl. 3, fig. 3.

At present known only from Mexico.

17. C. *transversa* Walker, Ins. Saunders, Hom. p. 15, C. *alacris*. Stael, Stettin, Ent. Zeit. v. 25, p. 62.

The type came from Mexico. I have examined a specimen from Texas.

18. C. *hilaris* Distant, Biol. Cent. Amer. Hom. p. 9, No. 11, pl. 2, Fig. 10.

This species belongs to the division having the narrow head. Also in both form and proportions it makes an approach to the genus *Tibicen*. It has thus far been found only in Mexico.

19. C. *intermedia* Distant, Biol. Cent. Amer. Hom. p. 10, No. 12.

Inhabits Mexico. Possibly this will prove to be only a form of the preceding species.

20. C. *robusta* Distant, Biol. Cent. Amer. Hom. p. 10, No. 13, pl. 2, fig. 3.

Inhabits southern Mexico, where it seems to be quite common.

21. C. *dissimilis* Distant, Biol. Cent. Amer. Hom. p. 10, No. 14.

Inhabits Mexico. It is closely related to C. *robusta* Dist., but differs principally in having much longer opercula.

Feb. 20, '92.

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22. C. *cinctifera* New Sp. Piceous black, moderately polished, related to C. *biconica* Walk., but with a narrower body. Pectoral surface, sides of face, tip and middle of base of tergum coated with white powder. Eyes prominent, but less so, and with a smaller posterior lobe than in C. *biconica*. Vertex short, dull black, with a small orange lunule at base, an angular spot in the corner near each eye, and a broad border of the same color running from near each eye to the depressions just behind the protuberance of the front; the impressions deep and sharply defined, and the surface with two or three coarse wrinkles near each eye. Front moderately blunt, minutely pubescent, with a bright orange, oblong, smooth spot above, and an impressed one at base of the upper surface; the transverse ribs acutely defined, carried far up, and lineated with yellow. Cheeks broadly bordered with yellow; the rostrum testaceous pubescent, piceous at tip, reaching to the end of the posterior coxae. Coxae and trochanters striped with piceous black, the femora clouded, the tibiae tipped, and the tarsi annulated with the same color. Pronotum gently concave, short, with the anterior border broadly and slightly curved, thickened, yellow, and followed behind by a transverse impression; the surface rugose on the lateral diagonal areas, and transversely wrinkled at base; the posterior margin almost straight, broadly yellow, with the outer angles feebly prominent; the lateral margin broadly depressed, with a widely curved yellow sunken lobe from behind the middle to beneath the eye, the humeral lobe produced diagonally, obliquely subtruncated, flat wrinkled, minutely pubescent. Mesonotum strongly convex, longer than wide, with a basal pair of slender yellow lines which start in depressions at base and curving inward toward one another become clavate at tip; mesothoracie cross slender, transverse, orange, strongly curving, lateral margins of the meso-

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notum thick and broadly upcurved. Wing-covers hyaline, long, with the costal vein, and basal veins greenish, the discoidal and apical ones dark brown, the basal areole subtrapezoidal, and marked exteriorly with a black streak; the w-brand almost obsolete; the first apical areole acute, narrow, as long as the third, and fully one-third longer than the second. Opercula greenish white, black at base, pruinose, triangular, a little rounded at tip, less than half as long as the venter. The middle line and exterior margin of the venter black, genital flaps of the male broad, valvate, last ventral segment broad, subtruncated, entire, the same segment of the female notched at the middle, sinuated each side of this, and with the latero-posterior angles produced into rounded lobes.

Male, length to tip of abdomen 26–28, width of pronotum 11, length of wing-covers 36, expanse of wing-covers 83 millims. Female, length to tip of abdomen 32–26, width of pronotum 10–11, length of wing-covers 33–37, expanse of wing-covers 76–85 millims.

Three specimens from Las Cruces, New Mexico, have been kindly sent to me by Mr. C. H. Tyler Townsend, and a large female was captured in Northern California by my friend, James Behrens.

23 C. *reticularis*. New sp.

Pale fulvous, similar to C. *biconica* Walk. with the same arcuation of the front of the pronotum over the head, and lateral margins correspondingly curved behind the eyes; but having the opercula much shorter and bluntly rounded behind, with the wing-covers shorter and more coarsely veined. Head triangular as seen above, with the eyes very prominent and rather narrow. Vertex tawny yellow; clothed with sparse prostrate golden pubescence; at base is a triangular black spot which connects anteriorly with a transverse abbreviated

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line that sends off a short branch each side of the base of the front; supra-antennal lobes short; marked with a black spot at the inner angle, the anterior margin also black until near the eye; front yellow, marked with black curved bands above, with the middle line smooth and unevenly grooved. Rostrum reaching the posterior coxae, piceous at tip. Front of pronotum much narrower than the head, remotely, minutely bronze pubescent, with the two exterior sutures, the apical half of the inner diagonal suture, connected with a hook posteriorly, two impressed dots at the forward end of the smooth middle line, and sutures posteriorly of the same line black; the lateral margin broad and flat, with the edge a little reflexed, marked with a black dot behind the middle, and powdered with white anteriorly; the humeral angles wide, bluntly rounded, pale fulvous like the posterior margin. Mesonotum strongly convex, pale chestnut brown, marked with four wedge-shaped black spots with rounded ends, the exterior pair being longer and followed exteriorly by a streak of the same color, a tinge of piceous across the disk, and each side back of this is a round black dot, the sides and area around the cross silvery pubescent, the cross compact, and with the arms strongly raised and curved; metomotal drum-segment long, convex, highly polished, chestnut brown, broadly tinged with piceous with the ample drum-covers pale. Underside pale ochre yellow coated with white. The opercula are less than half as long as the venter, pale ochreous, powdered with white, separated in the middle, bluntly rounded at the end. Legs pale ochreous, the anterior femora short and stout, with the surface above and below more or less piceous, the two spines long and stout, piceous beyond the base, the middle and posterior femora feebly carinated, the former set on both inner and outer surface with minute, black, spinous granules; tibiae sharp-edged, with the spines more or less black,

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the tip of tarsi and the nails piceous. Wings of medium length, hardly acute, hyaline, with the costa piceous, but yellowish on the outer border, and set with minute black spines; veins coarse, piceous, but paler back of the nodus to base, basal areole slightiy discolored, much longer than wide, the areoles chiefly large and long, cross-veins of the apical series brown on milky spots, the base of first apical areole and all the veins of this series on the middle and tip also brown, the apex of the seventh apical areole is more broadly marked on the outer end so as to form the figure of a hook; first apical one is long, narrow, acute at both ends and nearly twice as long as the second, both the first and second cross-veins oblique, sub-equal and a little bent; flaps of both wings more or less smoky, veins of wings pale brown, clearer yellow at base and near the flaps. Abdomen moderately stout, sub-conical, chestnut brown above, more or less banded with black, the surface silvery pubescent and powdered with white, the genital segment short, blunt, dark piceous above, pale beneath, and the last ventral segment moderately short, narrowed towards the tip, sub-truncated, with the outer angles broadly rounded.

Length to tip of venter 28 millims; width of pronotum 12 millims; expanse of wing-covers 87–89 millims

Two males of this beautiful species were collected on the south coast of Jamaica, east of Kingston, by my friend, Mr. Ross Harrison. The female remains unknown. This remarkable form contributes in miniature a type of marking which has thus far been recognized only in the tropics of South America, and heretofore represented by the great *Lyerman* of Guiana, the *Fidicina mannifera* of Fab.

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TIBICEN, Lat.

1. T. *septendecim* Linn. (*Cicada*), Syst. Nat. ed. XII., 1767, Pars. 2, p. 708, No. 20. *Cicada septemdecim* Oliv. Encyc. Method. v. 5, p. 749, No. 13. *Tettigonia costalis* Fabr. Ent. Syst. Supp. p. 516, No. 22. *Tettigonia costalis* Coquebert Illust. 1, pl. 9, fig. 2. *Cicada septendecim* Germar, Thon. Ent. Archiv. 2, p. 4, No. 43. *Cicada tredecim* Riley, First Report Missouri, p. 19, is the race which appears at intervals of thirteen years, chiefly in the region south of the Ohio river. The dwarfed and modified form, which appears late in the season, belongs to both the 17 and 13 year races. It has been described by Dr. Fisher as *Cicada cassinii*, Philad. Acad, Nat. Sci. Proceed. v. 5, 1851, p. 272.

Observations are needed to establish the length of underground life required to develop some of the forms of this species. That one of them which has the C. *cassinii* as its last term, and which gives forth the more prolonged and hissing note, seems to be in a state of transition. It comes forth fully grown almost every year in the region north and southeast of Baltimore, and that too from the very spots whence the normal *septendecim* issued in 1868 and 1885. Specimens were collected by myself at several marked points every year between 1880 and 1885, and I have received specimens of the same, through the agency of friends, every year since down to 1890. I am impelled to the belief that these creatures undergo periods of rest in the young stages, varying in length, and not yet defined by writers upon this species.

2. T. *rimosa* Say. Journ. Acad. Nat. Sci. Philada. vol. VI., p. 235, 2. *Cicada noveboracensis* Fitch, Agricult. of New York. Insects by E. Emmons, p. 152, pl. 9, fig. 6.

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The variety *noveboracensis* of Dr. Fitch has the orange color of the pronotum distributed in two broad spots on the sides, but in other respects it agrees quite nearly with the normal type distributed throughout the region west of the Mississippi river. A black variety occurs in Utah which lacks entirely the orange spots of the pro and mesonotum. The species extends quite across the North American Continent in the latitude of the great lakes, but while it does not appear south of Boston, in the eastern United States, it spreads along the Pacific highlands from Vancouver's Island to San Francisco.

3. T. *striatipes* Hald. (Cicada.) Stansbury, Exped., Great Salt Lake, p. 369; pl. 9, fig. 16.

The more prominent front of the narrow head with the yellow band across the vertex, the shorter first apical areole, and the yellow banded tergum will distinguish this species from the preceding. It seems to be confined to Utah, so far as is known at present, although the following species may prove to be only a variety of it·

4. T. *hesperia* Uhler, (*Cicada.*) Hayden, Geol. Survey of the Territ. Bulletin, 1876, p. 76, No. 5.

The type was captured near Denver, Col., and since then other specimens have been secured near San Francisco, and south of that city in the vicinity of San Diego. I have also seen a specimen from near Reno, Nevada.

5. T. *cupreo-sparsus* Uhler. Md. Acad. Sci. Trans. 1889, p. 43.

Three specimens are all that have yet been reported of this beautiful little species. Two were captured near Los Angeles, Cal., by Mr. Coquillett, and the other was taken near San Diego by Dr. Blaisdell.

6. T. *cruentifera* Uhler. New sp.

A large and long-winged, narrow, dull black species with bright orange costa and blood red flaps to both

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wings. Surface smooth, hardly polished. Head short, a little narrower than the front of the pronotum, closely pubescent,, with the sutures sharply defined; front prominent, almost acutely ridged, carrying a round pit above, with the lateral raised border yellow, the supra-antennal tablet feebly prominent, partly bordered with yellow; antennae long, slender, black; rostrum pale piceous at base, reaching behind the middle coxae. Pronotum short, black, moderately pubescent, rugulose, emarginated in the lateral margin behind the middle, the edge in front of this with several short, blunt teeth; the posterior angles moderately produced, reflexed, and rounded, the anterior angles hardly rounded, armed with a blunt tooth. Sternum dull black, hoary pubescent, with the raised borders of the lateral and posterior segments bright orange. Legs bright orange, with the coxae, femora and tibiae broadly spread with black, the tarsi piceous, or black; wings hyaline, long but not narrowed at tip, with the base of both pairs piceous, into which the red color of the flaps runs and extends upon the supporting pieces of the thorax, veins coarse, piceous black, as also the post-costal rib beyond the anostomosis, the basal areole long and narrow, infuscated, bordered anteriorly by an orange yellow vein, first apical areole long and narrow, acute at both ends, second hardly shorter, acute at base, a little curved, together with the following five, the cross-veins short, a little curved, acutely diagonal, the middle ones straight, and much longer, basal ends of three principal veins of posterior wings pale yellow. Meso and metanotum hoary pubescent, becoming more like fur posteriorly, the inner two ends of the cruciform prominence tubercular and yellow, the lateral and posterior edges of the metanotum reddish yellow. Venter broadly red along the middle line, or with the segments bordered with red, and the lateral raised edge also slenderly red, tergum minutely pubes-

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cent, the posterior edge of the segments red, but with the two apical segments more broadly banded with red, the genital sheath red, short, subacuminate, tooth of the apical segment of female short and acute, posterior border of the last segment of the male deeply emarginate.

Length to end of abdomen 25–26; width of base of pronotum 9–10; expanse of wing-covers 70–75 millims.

This is the brightest colored species of the genus thus far discovered in North America, which attains its richest coloring in the neighborhood of Reno, Nevada. Specimens of both sexes from this locality, captured June 21, were kindly sent to me by Mr. Hillman. A much less adorned variety occurs in other parts of Nevada, some of which were obtained for me by Baron Von Ostensacken, who also collected two specimens in the vicinity of Webber Lake, on July 23 and 27.

7. T. *Blaisdellii.* New sp.

Black, polished. sericeous pubescent, long, narrow, parallel-sided. Head black, pubescent, having longer hairs on the side of the face and clypeus; vertex deeply excavated, especially on each side, the supra-antennal tablets broadly margined with yellow, the outer edge of cheeks yellow; sutures of the surface deep, the one on base of head short, broad, yellow; front long, prominent, convex, with the transverse ribs and longitudinal sulcus sharply defined, the clypeus with a sharp longitudinal carina; rostrum reaching upon the middle coxae, the basal joint yellow; antennae short, black. Pronotum deeply sutured, bordered narrowly with yellow, with the humeral angles strongly produced. coarsely wrinkled, broadly bordered with yellow continuously with the posterior margin; middle line wide, polished, yellow, the posterior margin abruptly reflexed, broadly yellow; the lateral margin a little expanded, with the edge crenulated; pleural margins thick, reflexed, yellow;

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sternum and adjacent areas pubescent, with the meso and meta-pleural segments yellow, the remaining pieces and coxae bordered with yellow. Legs bronze pubescent, femora yellow on the knees and partly on the sides, sulcated; tibiae blackish, yellow on the inner side and tips, set with stiff hairs; tarsi blackish, pubescent, yellow on the sides, articulations and base of nails. Wing-covers and wings hyaline, the veins stout and chiefly black, the costal rib yellow along the middle line as far as to the nodus, origins of the basal veins orange yellow, the expanded vein of the clavus scabrous and coarsely punctate, with an angular black spot beyond the base, the radial cell large, wide, reaching beyond the middle of the wing-cover, and its bent apex forming the base of three ulnar cells, the cell below the radial one is narrow throughout one-half of its length, and beyond this it is greatly expanded towards its triangular tip, the cell next below this is shorter, but quite wide, with its inner vein strongly arched, and with a kind of triangular fuscous nodus bounding its outer end; membrane and adjoining margin of the mesonotum reddish orange, the subapical cell acute fusiform, much shorter than the second or true apical cell. Wings with the second and fourth longitudinal sectors yellow to the middle, the membrane dull yellow, longitudinally clouded with fuscous, and with the thick vein similarly colored. Mesonotum having a triangular yellow spot connected with the lateral margin, the disk marked with four yellow marks, the anterior of which form the posterior end of the impressed loop, while the two a little farther back are sagittate, and connected with the mesothoracie cross by a slender line from each. Abdomen much longer and narrower than in T. *rimosa* Say, black, polished, with the edges of the segments, both above and below, bright yellow; apical flap of the last ventral segment, (male) much narrower than the segment to which it is attached,

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it is narrowed at base, broadly rounded on the outer corners, and hardly emarginated on the apical margin; inferior genital sheath long, moderately narrow, wrinkled and hairy. Opercles yellow, widely emarginated on the outer side, with a long black spot exteriorly; the meracanthi long, auriculate, curved inwards; the tympani of medium size, thick texture, exposed, and placed laterosuperiorly. Length to apex of abdomen 20–24; expanse of wing-covers 59–66; and width of base of pronotum 9½–11 millims.

Only males have yet been examined. Specimens have thus far proved scarce. This curious species was discovered in the vicinity of San Diego, Cal., May 10–11, by Dr. F. E. Blaisdell, of Coronado, to whom the species is dedicated as a small token of the esteem in which his entomological zeal is held by the writer.

The peculiarity of the venation of the radial and adjoining cells might suggest the idea of giving characters for a new genus, but all the other elements of structure accord so closely with *Tibicen* that no sufficient reason seems to be foresent for making the separation. Through the elongation and expansion of these cells a close relation with *Platypedia* is suggested.

8. T. *canadensis* Provancher. (*Cicada.*) Naturaliste Canad. Cicadides 1889, p. 213, No. 3.

From the Province of Quebec. The description suggests a possibility of this being a synonym of T. *striatipes* Hald. But without actual examination of the specimen no satisfactory statement can be made. The description cited is almost worthless.

MELAMPSALTA Kolenati.

M. *parvula* Say. (*Cicada,*) Journ. Acad. Philad. 1825, vol. 4, p. 333, No. 5, *Cicada pallescens* German. Thon. Entom. Archiv. 1830, vol. 2, p. 8, No. 93. *Cicada Calliope* Walk. Brit. Mus. List. Hom. vol. 1, p. 212, No. 165.

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Common in various parts of the United States, and quite variable in color and pattern of marking. When fresh, the ground color is pale green, with the marking of the head, thorax and tergum brownish black; but when dried and kept for some time in the cabinet, it becomes pale or dark straw yellow. Specimens from Florida are much narrower than those from Illinois, Kansas and Nebraska. A male from Texas is faded straw yellow, with a little black on the vertex and about the antennae. The males are sometimes much smaller than the females.

By a mistake in copying manuscript this species was placed in *Carineta*, and was so printed in Entomologica Americana, 1888, vol. 4, p. 22. Mr. Walker's specimen was found at Warm Springs, North Carolina.

CARINETA Amyot and Serv.

1. C. *trivittata* Walk. Ins. Saund. Biologia Cent. Amer. Hom. p. 20, pl. D, fig. 13.

This is a Central American form which spreads north into Mexico, and which constitutes a type quite different from that hitherto best known from Brazil, Guiana, etc.

2. C. *marginella* Walk. Brit. Mus. List, Hom. Suppl. p. 21. *Carinet ancilla* Stål, Stettin. Ent. Zeit. vol. 25, 1862, p. 57, No, 380. C. *marginella* Dist. Biologia Cent. Amer. p. 21, No. 7, pl. 2, fig. 16.

Inhabits Mexico, and thus far has not been found as far north as Arizona.

3. C *lugubrina* Stål, Stettin. Ent. Zeit. vol. 25, 1862, p. 57, No. 381. Distant, Biologia Cent. Amer. p. 21, pl. 2, fig. 19.

A very small species, hitherto not found north of Mexico.

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TETTIGADES Amyot and Serv.

T. *mexicana* Distant, Biologia Cent. Amer. p. 6, pl. 2, fig. 9.

Captured in Mexico. This species is as yet not represented in the collections of any of the museums of the United States. The type is in the Berlin Museum.

ODOPOEA Stål

1. O, *azteca* Distant, Biologia Cent. Amer. p. 4, No. 3 pl. 1, fig. 4.

Thus far found only in Mexico.

2. O. *imbellis* Walk. Brit. Mus. List. Hom. Suppl. p. 2, Distant, Biologia Cent. Amer. p. 4, pl. 1, fig. 3 Stål, Ann. Soc. Ent. France, Ser. 4, vol. 1, p. 617.

Found in Mexico, and not known to occur north of that country.

3. O. *montezuma* Walk. Brit. Mus. List. Hom. vol. 1, p. 36, No. 6. Distant, Biologia Cent. Amer. p. 4. No. 1, pl. 3, fig. 5.

Known only from Southern Mexico.

4. O. *signoreti* Stål, Stettin. Ent. Zeit. 1862, vol. 25, p. 59, No. 385, Distant, Biologia Cent. Amer. p. 5, pl. 1, fig. 10.

Inhabits Mexico.

5. O. *medea* Stål, Stettin. Ent. Zeit. 1862, vol. 25, p. 60, No. 386.

As yet not found north of the City of Mexico.

6. O. *jamaicensis* Distant, Entom, Soc. Lond. Trans. 1881, p. 629.

Inhabits Jamaica.

7. O. *mesochlora* Walk. (*Cicada*,) Brit. Mus. List, Hom. p. 129, No. 67.

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Reported as found in Jamaica. Not present in the collections of the United States. From the description it is supposed to belong to this genus.

8. O. *tomentosa* Walk. (*Cicada.*) Brit. Mus. List. Hom. Supp. p. 22.

Found in the Island of St. Thomas. Supposed to belong to this genus.

9. O. *dilatata* Oliv. (*Cicada.*) Encyc. Method, vol. 5, p. 747, No. 6, Fab. Ent. Sost. vol. 4, p. 18, No. 5.

Fabricius gives the *habitat* Jamaica for this species. It seems to be unknown to modern collectors, but it is evidently quite near to a species in my collection which is common in Eastern San Domingo.

10. O. *chariclo* Walk. Brit. Mus. List. Hom. p. 146, No. 84.

A male in the British Museum, from Cuba, is the type from which the specific characters were drawn by Mr. Walker. The type must have been a faded specimen of the dark variety; for the average specimens when clean and fresh are clear pale green, without the faded tawny markings described by Walker. The black band across the vertex is usually composed of a chain of more or less round spots. The drum-covers are commonly pale green, clothed with silvery white pubescence.

11. O. *sagrae* Guerin (*Cicada.*) La Sagra, Hist. Isle Cuba, p. 426.

This is a large and conspicuous species, which appears to be common in the Isle of Cuba. Numerous specimens have been sent to me through the kindness of Professor Poey and Dr. Gundlach.

12. O. *walkerii* Guerin. (*Cicada.*) La Sagra, Hist. Isle Cuba, p. 426.

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Hitherto found only in the Island of Cuba, where it seems to be comparatively common. Specimens of both sexes were sent to me by Dr. Gundlach.

13. O. *poeyi* Guerin. (*Platypleura.*) La Sagra, Hist. Isle Cuba, p. 425, pl. 13, fig. 16.

This is the most remarkable of all the species yet discovered in the West Indies, if not in all America. Thus far it has been reported only from the Island of Cuba, where it is far from common.

The opacity of its wing-covers, varied by marbled grayish and brown tints, gives it somewhat the appearance of the Brazilian *Phenax variegata* Fab., but the genus *Phenax* does not extend to the Antilles, so that the pattern of marking fails to enter the domain of mimicy, so far as these two insects are concerned. The dried leaf style of wing here presented might contribute towards the protection of this *Odopoea* in certain situations, but we know so little of its habits that nothing certain can be stated with regard to this question.

14. O. Cariboea. New sp.

Form of the small type of *Odopoea imbellis* Walk. Pale chestnut brown tinged with green, marked with blackish piceous. Head wide depressed above, more triangular than in O. *Sagrae* Guer., with the lobe between the eye and tylus broad; eyes prominent; vertex with a large piceous central spot enclosing the ocelli, connected each side with a crescentic mark of the same color, and with a dark line on the margin above the antednae; the front barred each side with curved piceous lines, and with a line of the same color each side of the smooth middle line, the lateral lobes clouded above and below with piceous, sides of epistom and tip of rostrum piceous, the rostrum reaching a little beyond the posterior coxae; antennae blackish piceous, pale greenish

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at inner end of basal joint. Pronotum a little less expanded than in O. *imbellis* Walk., almost acute angled, the margin before the angle short a little curved, the margin behind the angle a little sinuated, and then curved inward at origin of the wings; incisures of the surface linearly brown, as also the lateral margin anteriorly, and behind the outer angle is a lunate blackish spot, the posterior broad margin and lateral expansion greenish; mesonotum broad, moderately convex, with two obconical marks at base, exterior to which each side is a similar but obscure and longer mark extending almost to the tip, posterior part of the disk crossed by a brown band composed of three angular spots; the surface more or less covered with sericeous prostrate pubescence; the cruciform dorsolum prominent piceous, with the sinus in front deeply and abruptly incised, and the posterior lobes broadly rounded. Opercula about one-fourth the length of the abdomen, greenish testaceous, narrowly separated, almost quadrate, with the posterior margin feebly curved, and the lateral margin reflexed, and slightly sinuated; the drums uncovered for about one-half of their inner surface, with their exterior cover inflated. Legs greenish yellow, the anterior femora short and stout, with two stripes above, angular marks at base and a band at tip; the tips of all the tibiae, an obscure band across their middle, and the tarsi piceous; posterior spine of the anterior femora slender and oblique. Wing-covers and wings tinged with milky white, the veins dark brown, but paler towards the base, costal one tinged with green, first apical areole long and narrow, marked with brown on the inner end of the vein, but little shorter than the third areole, first cross-vein quite short, acutely oblique, waved, enclosed by a brown spot, second areole much shorter and wider, third areole somewhat wider than the second, very acute at inner end, with the cross-vein

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longer than the first, curved and covered by a larger brown spot, third cross-vein longer, bent, forming a blunt angle, less broadly marked with brown, fourth cross-vein nearly equal and parallel to the third, but more bent, and invaded by a smaller brown spot, the basal areole narrow subquadrangular, a little tinged with fulvous, tips of the apical veins more or less distinctly tinged with brown; posterior margin of the clavus conjointly with the posterior flap fuscous; areoles of the wings mostly long and narrow, the sixth apical one wide, and much expanded towards the tip, the flap with a basal crescentic fuscous spot connected with an emittent streak which keeps on to the border. Abdomen subconical, polished, humped at base, acutely produced in the female, but long and almost parallel-sided and posteriorly depressed in the male; the tergum sericeous pubescent, marked with lines of piceous spots which spread apart into four series as they run back, the sides abruptly contracted behind the drum-covers; the apical segment contracted, marked with three or four blackish stripes: the last ventral segment short, narrow, entire, with the sides oblique.

Length to tip of abdomen 30–32 millims; greatest width of pronotum 15–16 millims; expanse of wing-covers 100 millims.

A female from near the City of San Domingo was kindly given to me by Dr. George H. Horn, and a pair, male and female, were secured for me in the vicinity of Samana Bay, at the eastern end of the Island of San Domingo. They were captured during the month of May, 1883, in company with other, more abundant species, by Mr. M. A. Frazar.

This beautiful species appears to me to be the one figured and described by M. Palisot de Beauvois, in his Insectes recenillis en Afrique et en Amerique. 1805, p. 132, pl. 20, fig. 5, where he confuses it with the *Cicada*

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tympanum of Fabricius. The Fabrician species is a well known Brazilian form which belongs to the genus *Zammara* Amyot. The last named author has added to the confusion by referring the species of Beauvois to the largest and finest form of *Zammara* yet discovered in Brazil, and has given it the name Z. *strepens*. This *Zammara* has nearly the same markings of pronotum and wings as our species from San Domingo, but it belongs to a different genus. The Brazilian one is much too large and broad to agree with the figure of Beauvois. Morever, the species of Beauvois was given as from San Domingo, presumably from near Cape Haitien, where he lived and collected many insects, and from which country no large *Zammara* of this type has yet been collected. The Z. *strepens* Amyot, Hemipt. p. 469, No. 2, is common near Rio de Janeiro, and it appears to be merely the best developed form of Z. *tympanum* Fabricius.

15. O. *domingensis*. New Sp.

Form nearly of O. *Sagrae* Guerin but with the head a little more blunt and narrow, the sides of pronotum angular and more widely expanded, the opercula feebly arcuated, and the last ventral segment much shorter and deeply emarginate. Ground color much suffused with reddish in the tawny, on the greenish olive tints of the fresh specimens; while the flaps of both wings, including partly the basal areole, are tinted with bright carmine. Head short and blunt, excavated, depressed and flat, anteriorly with a curved band of black spots crossing the line of the ocelli, other black spots are present upon the top of the front and on the supra-antennal lobes, front moderately blunt, grooved from below the top to near the tip, smooth, greenish, silvery pubescent, infuscated above; rostrum reaching upon the posterior coxae, blackish at tip, eyes prominent, but less so than in O. *Sagrae*, the width across them including the vertex is a

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little less than the width between the wing-covers. Pronotum tawny, silvery pubescent, as wide as the abdomen is across the middle, sutures, anterior sub-margin and lateral margin black, anterior angles prominent, lateral expansions angular, with the anterior side a little shorter than the posterior one, and with a tabulated and reflexed border; the mesonotum convex, smooth, silvery pubescent on the sides, not much wider than the head across the eyes, two long black spots run back from the base, which are bounded by the looped impression, a small spot stand, each side of these, and exterior to the latter is a curved streak parallel with the exterior margin, impression in front of the cruciform dorsolum is marked with a three-pointed large black spot, the dorsolum more or less infuscated, and wrinkled in the impression of each side. Beneath greenish testaceous, polished, silvery pubescent on the sides. Opercula pale, about one-fourth the length of the venter, lobate at the inner ends which are separated by a narrow space; drums exposed inwardly, with small inflated covers exteriorly. Legs greenish fulvous, with the knees more or less clouded with brown, the antcrior femora stout, marked above, at tip and exterierly with brown, and with the two teeth piceous; tibiae with an obscure brown band on the middle, the tibial spines, as well as the tarsal nails also piceous. Wings of the usual long and narrow form, transparent, spotted with brown near the tips of the apical veins, as well as at the base of each apical areole, excepting the sixth, the mark at the end of the seventh apical vein is bent into the form of a hook, the first and third areoles sub-equal in length, acute at base, narrow and nearly one-third longer than the second, base of all the wings more or less fulvous around the red of the flaps and basal areole, with the fold of the wing flap and the exterior margin of all the wings brown, Tergum polished, humped and piceous at

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base, and this color continued back upon the middle, and posterior border, of the segments. The female is lighter colored and less obscured by brown than the male.

Length to tip of abdomen 23–26 millims; width across middle of the pronotum 10–11 millims; expanse of wings 72–79 millims.

These fine insects were found in large numbers near Samana Bay, San Domingo, in the month of May, by Mr. Frazar. All the females thus far examined have been much smaller than the males. The spur on the last tergal segment of the female is acute, and longer than in the other species which we have studied.

16. O. *cuncta* Walker, (*Zammara.*) Brit. Mus. List. Homopt. vol. 1, p. 39, No. 9.

Unknown to me except in the description cited above. It is said to be an inhabitant of Jamaica.

17. O. *plena* Walker, (*Zammara.*) Brit. Mus. List. Homopt. vol, 1, p. 38, No. 8.

Captured in Jamaica by Mr. P. H. Gosse.

18. O. *erato* Walker, (*Zammara.*) Brit. Mus. List. Homopt. vol. 1 p. 41, No. 11.

Inhabits the same locality as the preceding species.

19. O. *suffusa* Walker, (*Zammara.*) Brit, Mus. List. Homopt. vol. 1, p. 37, No. 7.

Inhabits the Island of San Domingo.

I have ventured to place the four last species in the genus *Odopoea*, as the descriptions seem to warrant such a disposition.

ZAMMARA Amyot and Serv.

1. *Z. smaragdina* Walker, Brit. Mus. List. Homopt. vol. 1, p. 33, No. 3. Distant, Biol, Cent. Amer. Hom. p. 3, No. 1, plate I. fig. 1, Z. *angnlosa* Walker, Brit. Mus. List. Homopt. vol. 1, p. 34, No. 4.

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This superb insect appears to be quite common in southern Mexico; but it has not yet been found in any of the provinces bordering the territory of the United States. It is a genuine tropical form which extends at least as far south as to the Isthmus of Panama.

2. Z. *calochroma* Walker, Brit. Mus. List. Homopt. Suppl. p. 4, Z. *smaragdula* Walker, Insecta Saund. Homopt. p. 4, Z. *callichroma* Stål, Stettin, Ent. Zeit. vol. 25, 1862, p. 57.

Also inhabits Mexico and extends southward in distribution as far as Bogota, Venezuela.

It is likewise a tropical form, which is quite variable in size and in the pattern of marking of the wings.

ADDITIONS TO THE FAMILY CICADIDÆ.

By P. R. UHLER.

CICADA Linn.

1. C. *sordidata*. New sp.

Narrow, obscure fulvous, extensively spread with minute, prostrate, bronze pubescence above, covered with white powder beneath, and on the face and coxae, markings obscure. Head across the eyes wider than the base of the pronotum, the vertex is chiefly blackish piceous, but it has a pale brown spot each side, midway between the ocelli and eyes, the sunken transverse line in front of the anterior ocellus waved, the eyes quite prominent, front blunt, with the transverse ribs slender and piceous, rostrum greenish yellow, stout, reaching to near the tip of the posterior coxae. Pronotum short, a little narrowing anteriorly, fulvous, with the posterior wide margin, the sutures, wedge shaped central mark and transverse ribbed lunule behind it piceous; anterior margin reflexed lateral margin a little sinuated behind the middle, with

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the posterior angle slightly rounded; the sub-margin depressed, and the humeral extension recurved so as to overlap the base of the wing cover. Mesonotum convex, narrow and short, dark chestnut brown, with a loop of testaceous bounding the medial sutures extending back from the base, the depression in front of the dorsal cross, the exterior margin and the posterior edge of pleural lobes pale fulvous, or tinged with piceous; the cross, short, abruptly elevated, it and the adjacent surface dark piceous. Legs greenish testaceous, the anterior femora a little infuscated above, spines and teeth and nails all dark piceous, the knees and tips of tibiae slightly piceous. Wing-covers long and comparatively narrow, faintly tinged with bronze, the areoles generally long; the first three apical ones, including the veins and cross-veins, smoke-brown, veins chiefly green at base, but brown from the clavus to the apex, the costal one green, bordered inwardly with piceous, the first apical areole long and narrow, acute at the inner end, about as long as the third; the first cross-vein acutely oblique, a little longer than the third, and both of them waved, the first cutting the apical areole at its inner third, flaps of both wings a little infuscated, Opercula short, pale, but little more than one-third the length of the abdomen, narrowing towards the tip, and rounded there; the tips widely separated by a wedge-shaped space; the drums completely covered by an inflated segment, with a wide interval between, which is occupied at the outer end by a smooth hump. The raised smooth line thus begun is continued back upon the succeeding tergal segments, and from each prominence a grooved line extends outwards to the border of the segments. The abdomen of the male is acuminately contracted at the tip, and has a short horn-like process each side of the genital segment, the apical ventral flap is much shorter than the segment to which it is attached, it is narrowed and very blunt, rounded at tip.

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Length to end of abdomen 20-22 millims; width of base of pronotum 8-9 millims; expanse of wing covers 59 millims.

Two males from Southern Florida are the only specimens known to me at present. This is much narrower than either of the other species of the pattern of C. *bicosta* Walker, to which it belongs. The structure of the metanotal segment, forming as it does a scale-like plate placed in the depression between the drum-covers, forcibly recalls the genus *Selymbria*, and thereby affords a link of connection between the two genera.

2. C. *reperta*. New sp.

Closely related to C. *sordida*, but broader, with clean markings on the head and thorax, the inner ends of the opercula overlapping and marked with black across their base, and with the lateral margin of the pronotum more expanded anteriorly. Head, as seen from above, blunt and short, with the eyes prominent and directed obliquely, top of vertex with a large bilobate, black spot which is connected each side with a streak which runs along the margin to the eyes, vertex crossed by a broad black band which joins a semicircle of the same color next the eyes, and also connects on the middle with a double black spot behind the ocelli, the intervening surface is tawny yellow; face clouded with piceous each side, pubescent, the front abruptly tumid, bordered with piceous each side on the thickened margin of the longitudinal sulcus, the transverse ridges fulvous, with the intervening grooves more or less piceous; rostrum reaching to the posterior coxae, the tip piceous; and the two basal joints of antennae yellowish, with the tip of the second black. Pronotum fulvous, with a slender anterior border, a median abbreviated line, and the broad posterior and lateral margins greenish yellow, luteous when old, the lateral margin strongly upturned, with the anterior angle prominent, but curved, behind this the

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border is sinuated and followed by a small black spot before the posterior blunt angle of the produced humeral expansion, the inner corner of the latter a little rounded; the sutures mostly stained with piceous, a black diagonal undulating line runs back each side of the disk and connects behind with a transverse angular band at the posterior suture, the short impressed line each side of disk is also sometimes piceous; mesonotum dark fulvous, bordered each side with yellow, the two dark short lobate basal spots bordered with yellow so as to form loops, and then this color is spread out over and next the elevated cross, which latter is marked on the middle with a black spot, and bordered in front by a more or less branched and expanded piceous transverse spot, hollow spaces exterior to the cross profound; breast powdered with white; the opercula white; a little more than one-third as long as the abdomen, with the extero-posterior angle a little the longest and rounded, the drums not exposed, the drum-covers dark chestnut brown, scabrous, almost flat, the short segment between them pubescent, dark brown, deeply sinuated, the sinus followed behind by a fulvous, polished spot, the remainder of the basal segment is piceous, bordered behind with fulvous. Wings, hyaline, long and narrow, either without or with only a faint mark at the apical brand, the areoles moderately long, costal rib, green, postcosta tinged with brown, the first apical cell narrow, acute at base, with the first cross-vein intersecting it a little way back of its middle, the second cross-vein a little shorter than the first, but almost equally diagonal with it and the third, sometimes a little waved, the apical series of veins infuscated, the discoidal and basal ones greenish yellow, with the minute nodal points fuscous, the basal areole yellow, long, bordered with brown, and with a brown spot in the outer angle, flaps of all the wings, yellow, bordered with

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Albinfean

fuscous. Tergum mostly piceous brown with the posterior edges of the segments testaceous or fulvous, the apical segments short; venter pale green, a little piceous at base of segments, with the lateral edge blackish piceous, the last ventral segment sub-triangular, transversely wrinkled, sub-truncated, piceous before the tip.

Length to tip of abdomen, 23–25 millims; width of base of pronotum, 9–10 millims; expanse of wing-covers, 66–70 millims.

Several specimens of both sexes have been examined by the writer. They were mostly captured in several parts of Florida, while one was found near Newbern, N. C., and another came from the vicinity of New Orleans.

OBSERVATIONS ON SOME REMARKABLE HETEROPTERA OF NORTH AMERICA.

By P. R. Uhler.

Within the last few years various novel forms of Hemiptera, in both Heteroptera and Homoptera, have been gathered in, especially from the more recently populated States, such as Arizona, New Mexico and Southern California. But our own eastern region is also yielding novelties, and through the careful collecting done by a few of our entomologists, especially of Washington, we are acquiring a closer knowledge of the smaller forms belonging to the Fauna east of the mountains in Maryland and Virginia. Notably is this the case in the families *Capsidae*, *Tingidae*, *Anthocoridae* and *Coriidae*. In some of the families, however, at present known by but few forms, there are some remarkable types of structure which seem deserving of present notice.

May 28.

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Sub-Fam. HENICOCEPHALINA, Stål.

HYMENODECTES. New genus.

Form suggestive of a long, narrow *Anthocoris*; much narrower than in *Enicocephalus* Westwood, to which it is nearly related. The suborbate posterior lobe of the head a little longer than the lobe carrying the eyes, constricted abruptly both before and behind, a little narrower than the width across the eyes. Antennae normal, the apical joint a little shorter and thicker than the preceding one. Rostrum not extending to the base of the throat, very stout, acute at tip; the apical joint very short and slender, much shorter than the stout basal one; the middle joint as long as both the others united, almost as stout as the basal one. Pronotum longer than wide; the middle lobe longest, suborbicular, a little wider than long, indented anteriorly, separated from the other lobes by a constriction; posterior lobe shorter and wider than the middle one, somewhat flattened on the middle, widely sinuated behind (not emarginated), exposing the base of the transversely convex, and at apex acuminate, short scutellum. Wing-covers narrow, membranous throughout; the costal areole narrow, long, acute, reaching two-thirds way to the tip, where it terminates in subcoriaceous pterostigma; a short marginal cell follows this, the bounding vein of which curves outward to the subcostal margin; next beyond this is a large open triangular cell which forms the apex; next to this follows a nearly parallel-sided long space, which is not cut by a transverse vein, but extends back to the apex; the inner marginal division is composed of two long cells, the apical one of which is the shorter, and subelliptical with an acute tip. The legs and abdomen are normal, as in *Henicocephalus* Stål. The characters from the wings cannot be drawn from the specimens at my command.

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H. *culicis*. New sp.

Pale, smoky testaceous, tinged with piceous on the lobe of the head which holds the eyes, and on the tumid lobe behind this. Immature specimens have the front of head, pronotum, excepting the base, and scutellum yellow. Texture thin and flabby, the veins of wing-covers coarse and dark-colored. The last joint of the antennae infuscated. Rostrum pale piceous, the apical joint yellowish. Intermediate and posterior tibiae and margins of venter pale testaceous.

Length to tip of venter, 3–3¼ millims; width of base of pronotum, ¾ millim. Only a few specimens have been brought to my notice, and most of them were so tender as almost to prohibit adequate examination. They were taken in Southern Florida, Cuba, Arizona, District of Columbia, and latest of all, Dr. Schwarz has obtained two specimens from the vicinity of Great Salt Lake, Utah, on June 14, 1891. A dwarf specimen from Florida measured only about 2 millims in length.

HYMENOCORIS. New genus.

Form of typical *Henicocephalus* Stål. Antennae much longer than the pronotum, gradually tapering towards the tip; the basal joint short and stoutest; the second longest, a little thicker than the third; the third a little shorter and thinner; fourth, shorter than the third and a little thinner; all the joints set with close, erect bristly hairs. Tumid basal lobe of head thicker than the width across the eyes, shorter than wide, longitudinally cleft; front lobe longest, narrow and snout-like, widened anteriorly; all the lobes defined by sutures. Pronotum composed of the three lobes which increase in width posteriorly, the anterior one being only a narrow collum for the middle one, which is a knob-like ridge separated from the triangularly expanding, much wider and flatter posterior lobe; the back margin of the latter broadly sinuated. Wing-covers

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broad, spindle-shaped, widest next the tip, and broadly rounded there; membranous throughout, with a large, long, triangular pterostigma; veins coarse; the costal areole narrow, carried almost to the tip, ending with the pterostigma, followed next the tip by a wide suboval areole; second series of areoles terminating by a moderately short apical one, which expands curvingly at the open tip, the vein of its base directly transverse; next series of areoles consisting of a long, narrow one, gradually widening towards the diagonal end at middle of wing, continued by a slightly expanding long and wide areole, which is separated by a slightly diagonal cross-vein from the still wider, rectangular, open, apical one; the inner marignal series consists of a long, narrow areole from the base of the wing to before the middle of the penultimate areole of the preceding series, the apex finished by a much wider subelliptical acute areole. Wings with a vein running out a short way from base and sending forth a fork of two veins to the tip, the basal vein surmounted near base by a long, narrow, acutely closed cell. Legs normal. Abdomen flat, as in the preceding genus.

H. *formicina*. New sp.

Body broader than in *Hymenodictes culicis*. Ground color fusco-piceous, a little polished, minutely pubescent. Wing-covers smoke brown, the veins darker; wings paler, with the veins smoke brown. Scutellum, tinged with rufo-piceous, moderately convex, polished. Tergum paler than the venter, flat, with the incisures of the segments pale testaceous, or whitish. Middle and posterior tibiae a little paler than the anterior ones. Length to tip of abdomen, 5 millims; width of base of pronotum, $\frac{7}{8}$ millim.

Taken in the vicinity of Los Angeles, Cal., by Mr. Andrew Bolter; also sent to me from the same locality by Mr. D. W. Coquillett.

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Fam. CAPSIDAE, Autor.

HADRODEMA Fieber.

H. *pulverulenta.* New sp.

Closely related to H. *rubicunda* Fallen, of Europe, but with the second joint of antennae much stouter and shorter, besides other differences given below. Ground color pale fulvous, unevenly spread with whitish pubescence. Head blunt, as viewed from in front, remotely, obsoletely, minutely punctate, and very finely pubescent, with a pale streak next the eye and a pale yellow spot on both divisions of the cheeks; antennae short, fulvous; the second joint very stout, about equal in length to the third and fourth united, fuscous at tip; the third and fourth sometimes infuscated; base of vertex obsoletely incised, and sometimes marked with a pale dot; eyes blackish, rostrum yellowish-testaceous, piceous at tip, reaching to behind the middle coxae. Pronotum closely, finely, roughly punctate, strongly convex, steeply sloping anteriorly, with the callosities prominent and polished, the posterior margin curved, slenderly bordered with pale yellow; collum sometimes pale, and with a very slender pale line running back from its middle on the disk of the pronotum. Scutellum convex, punctate like the pronotum, with a smooth, pale, slender line extending to the tip. Hemelytra punctate like the pronotum, with the pubescence sometimes unevenly distributed; cuneus more or less pale, a little curved, usually bordered with reddish; membrane with a small smoky spot at base and a large one reaching to the tip. Legs dark amber yellow, with the spines, end of tibiae and tip of tarsi piceous; the femora generally with two brown bands near the tip; the coxae and middle portion of the sternum pale testaceous; the sides of sternum more or less dark brown. Venter polished, more or less piceous next the tip.

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Length to tip of venter, 4–4½ millims; to end of membrane, 5 millims; width of base of pronotum, 1¾–2 millims.

One specimen was captured near Utah Lake, June 26, 1891, by Dr. Schwarz. It is a common species that is now known to be widely distributed on both sides of this continent. Specimens have been sent to me from numerous localities, among which may be mentioned Massachusetts, from Cape Ann to south of Boston; Connecticut, near New Haven and Hartford; New York, eastern, central and western; New Jersey, near Newark and Egg Harbor City; Pennsylvania, near Philadelphia, and in York County it occurs in gardens on blossoms of the Privet, *Ligustrum vulgare* Linn. Mr. Stromberg sent specimens to me from Galesburg, Ill.; Mr. B. D. Walsh, from Rock Island. Robert Kennicott collected it near Evanston and at other places in northern Illinois, and also in Wisconsin. Several of the United States expeditions brought it from Kansas and Colorado, and I have met with it both in Maryland and Virginia. Mr. Morrison took it in Georgia and North Carolina; Mr. Belfrage found it in central Texas, and more recently Mr. O. Heidemann has taken it near Washington, D. C., on June 7.

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ALBIRUPEAN STUDIES.

By P. R. Uhler.

An analysis of the beds and groups of strata belonging to the Albirupean series opens out numerous questions relative to the original structure and later modifications of the whole column of beds underlying the Greensand or marine Cretaceous system of the Atlantic States, south of New England and north of North Carolina.

The writer has now no hesitation in referring all the members of the groups of strata which are in place between the top of the genuine "Variegated Clays" of the Iron Ore series and the bottom of the marine Cretaceous formation to the Albirupean formation.

The writer claims for this complex of strata and beds a distinctness of origin, a difference in type of deposition, a different direction in the deposition of the materials composing the fundamental beds, a consequent unconformity with the underlying or Potomac formation, a non-concurrence in the extension of the two formations, a different position for their shore lines, and a different set of representative fossils for the two formations.

This position here taken is based upon a comparison of the sand, sandy clay and clay, as to their physical elements, contents and composition, and the conclusion is that the Albirupean formation has been laid down mainly within the barriers of, and chiefly upon the eroded, hollowed and uneven surface of the Potomac formation.

Consequently, that the Albirupean is much the younger, and, where undisturbed, holds within its beds a more recent fauna and flora.

Whatever may be said of the beds on Martha's Vineyard, which contain the fossil flora of a Cretaceous type, we are enabled to see that there is a fossil flora of the beds in the northeastern part of Middlesex county, near

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the Raritan river, N. J., which agrees with specimens from near Bordentown; likewise from Kincora, N. J., from the shores of Chesapeake bay, Md., near the Elk and Sassafras rivers; from the Severn river, on both shores of Round Bay, and from the strata near the Magothy river, south of Cypress creek, in Anne Arundel county, Md. All of these localities afford, either from the pale clays of the Alternate Clay-Sand series, from the darker or black clay within this series, or from the dark or marbled white clay in either the upper or low part of this groups of beds, a flora which may be represented by *Araliopsis*, *Cornus*, *Myrica*, a peculiar *Sassafras*, *Ficophyllum* related to *eucalyptoides*, a small-leaved *Rogersia*, *Protophyllum*, and many other genera and species of *Dicotyledonous* plants—as a whole, presenting a facies much like that of the Dakota group as described and represented by Mr. Lesquereux, in Vol. VI of Dr. Hayden's Report of the U. S. Geological Survey of the Territories, 1874.

Thus far no Cycads or very lowly organized Angiosperms have been taken from the undisturbed beds of this series.

Protaeaephyllum, *Celastrophyllum*, *Vitiphyllum*, and the other types found in the beds associated with the iron ore clays, and representative of the Potomac formation, find no place in the Albirupean deposits.

A long interval of erosion and displacement of beds must have followed the deposition of the "Variegated Clays," for the clays and mixtures of which they form the upper member have been eroded almost to base line over wide areas in Baltimore and Anne Arundel counties, besides the localities where the Potomac strata are conspicuous in Harford and Cecil counties, Md.

Starting from the shores of the **Raritan** bay and pursuing a course from the vicinity of Matawan creek in a

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southwest and west direction, we find at the base of the hills, where the water courses have cut deep into the deposits, a series of beds of white, drab, lead-colored or red clays, more or less stratified. These, especially towards the east, are covered by pale or white sands, which underlie another system of more closely stratified sandy clays and clays with narrow partings of fine sand. In some of the hills, exposures of thicker strata of less sandy clay also appear.

Besides the above, near the summit of the series at the **Atlantic** Highlands of New Jersey, extending from next the beach to a height of about fifteen feet, there appears a flaky, black, micaceous earth, which rises into a tenacious black, sandy marl and extends up to the base of the true black marl of the "Lower Marl Bed." At this point appears the base line of the deep sea deposits, which is often difficult to distinguish. This line can, however, be traced wherever the conditions are favorable. For convenience we will call the underlying black stratum the **Albirupean Black Marl.** This Albirupean Black Marl forms the base of the Atlantic Highlands, and is exposed from near the long steamboat pier above the town all the way down along the face of the high cliffs for a distance of nearly one mile. A few rods southeast of the bath houses belonging to the Grand View Hotel this stratum reaches a thickness of about sixty feet, but it rapidly decreases in continuing along this course until before the next pier is reached it slopes down to beneath the beach, and is lost to view. Along this course it is generally almost impossible to recognize the line of demarcation between it and the directly overlying "Lower Black Marl." There are, however, a few points along the exposure where the overlying marl is more argillaceous, and where coarse sandy material and shells of mollusks (*Gryphaea vesiculuris*, *Exogyra costata*, etc.) rest directly upon the

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Albirupean Black Marl, while the latter contains only lignite and fragments of the leaves of plants and trees.

Below this part of the face of the Highlands the "Lower Black Marl" continues to the bend of the shore, and grows lower as it passes towards the Navesink river. At its northwestern extremity the Albirupean Black Marl is almost abruptly cut away by erosion, which made way for the lowland west of the pier. A noteworthy correspondence with the abrupt termination of the Albirupean Black Marl on its northwestern border appears at three or four points along its stretch southward, viz., near the steamboat pier at the north end of Atlantic Highlands, and at Bordentown, N. J., then at Grove Point, mouth of Elk river, Md., and at the upper end of Round Bay, Md. These beds do not rise so high at Bordentown; they are not above forty feet high at Kincora, and they are still lower at Fish House, above Camden, N. J. When, however, we cross the greatly denuded level north of Wilmington, Del., and reach the North East river in Maryland, beds precisely like these occur in the body of Maulden's mountain. Next southwest of this point they are exposed along nearly the whole length of the Grove Point bluff. Farther south they appear on the opposite shore of the Sassafras river, and form the lower stratum of its bluffs all the way down to Howell's Point.

Crossing the Chesapeake bay, they appear in the same succession on the Magothy river south of Cypress creek, and they next appear in the same order of superposition in the bluffs at the head of "Round Bay," on the Severn river.

This black marl is of the same type everywhere. It is usually compact and not distinctly stratified, but occasionally takes on a species of bedding in planes which might be regarded as obscure stratification.

The only remains thus far discovered in these black

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beds, where undisturbed and in place, are leaves, branches, wood, and seeds of plants and trees, of much more modern type than those which occur in the undisturbed Potomac clays. Wherever they are most compact and argillaceous, little else than lignite, more or less coated or impregnated with iron pyrites, is to be found imbedded in them. When, however, they are laminated or foliated, the leaves of many genera and species of Angiosperms are distributed within the layers.

These beds of black marl are not lenses; they form thick, long, and wide deposits in ridges and belts, which are discoverable at various intervals between the Raritan bay and the country south of Trenton. They extend from Bordentown to Kincora, and are exposed at intervals near the Delaware river. At Fish House they present extensive deposits, and may be seen in deep cuts which extend into the suburbs of Camden.

In numerous places throughout western and central New Jersey, but notably near Washington and Sayresville, and from thence to South Amboy, and again from the latter place to the hills east of Cheesquake creek, the black clay marl forms the body of broad areas of high rolling country. The more compact and plastic form of it constitutes immense deposits, running deep below tide-level in the high region west of South Amboy.

These black clay marls must not be confused with the dense blackish strata called "Blue Clays" in the Woodbridge district. In that region the black marls occur in beds at a much higher level than the "Blue Clays," and wherever the Alternate Clay Sand series is well developed, the black clay marls usually appear as the thickest member. They do not always occupy the upper part of the alternating group, since in certain exposures the sandy layers are more numerous and have their greatest development superiorly. In other cases the black marls have

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attained superior growth, and the sandy layers and strata are correspondingly undeveloped, or even omitted. On the western side of Cheesquake creek the Alternate Clay Sand series has an exposure of the alternating thin layers of drab or dark clay parted by the fine white sand, in which the black clay marl is reduced to a minimum. Two miles west of this point, in the high ridge back of South Amboy, a "Clay Bank" is being excavated on the property of Mr. Whitehead, where the section shows finely the relation of nearly the whole column of strata belonging to the Raritan Clay complex. As work has not there progressed to a great depth, the lower and lowest strata cannot be seen, but by going to the side of the cliff on the Raritan river we are enabled to discriminate the entire series of strata, from the river to the summit of the ridge, or to a height of more than 100 feet above tide.

This combination of exposures shows that the fine white plastic clay forms the base of the series, and that the other varieties of the Woodbridge Clays and sandy clays continue it up to the Kaolin bed, which there gives a thickness of at least six feet. Next above this comes about eight feet of sandy pale clay, and over it rests five feet of pale, fine plastic potter's clay of great smoothness. These clay strata are generally well distinguished, by a structural break of great distinctness. This last upper member of the fine marketable clays is eroded into dome-like prominences, and upon its uneven surface rests the Black dense Clay Marl. This member rises a few feet and then grades into the typical Alternate Clay Sand, which is in turn overlaid by another stratum of the Black Clay Marl. The whole of this last combination reaches a thickness of about twelve feet. The upper part of this group has suffered by erosion, followed by cross bedding through a diagonal hollow or trough about six feet deep.

The cover above this is the Quaternary yellow sand,

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ten to twenty feet thick, and this last is overlaid near or at the surface by four to six feet of the small quartz gravel, which is generally spread on the hills of this region.

The entire series in this region is thus seen to be Albirupean. No sign of the "Variegated Clays" appears in any group of these deposits, and they can all be matched in the Round Bay part of Maryland, which overlies the genuine Potomac formation. The Woodbridge Clays likewise belong to the Albirupean formation, and most of them are included in the section reported above. Texture and composition go far in identifying the clays and clay-sands of all the above regions of New Jersey, and color and its distribution are not of much value in discriminating the different types of these materials.

As examples may be cited the basal white clays of the Sayresville district. There, in several exposures, portions of the beds are stained red throughout a stretch of many feet, and in parts of the very same strata a sort of red or yellow marbling appears, which gives much the same effect as does the true Variegated Clay.

The marshes of the Delaware river between Chester and Wilmington have evidently been cut through the Alternate Clay Sands, since some of the clays and sands on which they rest are exposed in excavations of the surface. They occur in the same order of superposition in both Maryland and New Jersey, so that a section taken at the head of Round Bay, on the Severn river, Maryland, will serve as a type of the formation wherever it occurs. Thus, at the last named locality, we observe a stratum of clean white sand extending below tide level, which rests upon plastic **Variegated Clays** that rise into hills when the Severn river is ascended a short distance. These "Variegated Clays" become dark lead-colored in some localities, as above the "Iron Ore Clays" in the region between Baltimore and Washington. Their equiva-

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lents have not yet been identified in New Jersey, unless they should prove to be the same as those beneath the mixed clays north of Trenton.

The fine white sand occurs in belts of variable thickness, ranging from sixty feet on the upper Severn river to five feet in Kent and Cecil counties, near the Elk river. This sand is overlaid by white or pinkish white, plastic clay of fine texture, from three to fifteen feet in thickness.

Next above this, however, often rests a stratum of brown sandstone, sometimes substituted by a laminous type of brown clay-stone, which carries the asphalt-like laminated black stratum that lies next under the typical part of the Alternate Clay Sands.

Above this is a series of fine white sands alternating with layers of pale drab, sandy clay, which are no more than an inch in thickness in some sections, while they widen out into strata many feet thick in other exposures. In some parts of this member, pale marbled fine clays take the place of one or two of the thicker beds of unicolored drab clay. Above this rests the brownish, flaky clay, which is loaded with the leaves and remains of trees and plants. This latter stratum is the underlying member of the great Black Marl bed, which forms in many places the summit of the *Albirupean formation.*

The great beds and layers of **White Sandstone** belonging to this formation are in place in the coarse member, composed of sandy clay and sand, which underlies the Alternate Clay Sands series.

Allowance must be made for the denudation and erosion which has obscured the relative position of the White Sandstone. In some places it rests upon the mixed sands of more or less reddish or brownish color, as on the southwestern shore of the Severn river above Valentine's creek; in the estuary of this creek it rests in the white sands, both above and below tide level.

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The Alternate Clay Sands have been carried away from the slopes and summits of the ridges of Variegated Clays on the Patuxent river east of Bowie, so that the white sandstone now rests at all angles and at several levels, from near the present bed of the stream to about thirty feet above, in the sides of the hills.

The name **Albirupean** was applied by the writer in January, 1888, to a wide-spread series of sand, sandstone and clay strata unconformably overlying the Potomac formation of Mr. McGee, but a part of which that writer included in his description of the formation.* Later, Prof. Fontaine† described a large number of fossil plants, chiefly from Virginia, which he referred to this Potomac formation, and at the same time gave a summary of his views relative to the structure, composition and extent of the formation.

My own studies of the deposits at Fredericksburg, Va., and other places between that city and Mount Vernon, induce me to take a very different view from Prof. Fontaine of the structure of the region, and of the position held by the fossil plants in the order of their succession in time.

The following facts have influenced my belief in the theory of succession of the strata or beds and their contents: The lowest iron ore clays, at the base of which the most archaic types of Angiosperms occur, are those beneath Federal Hill and its connections in Baltimore. The same series of clays is identifiable in many places all the way from near the North East river, at the head of Chesapeake bay, to the District of Columbia. Local areas of similar clays which have not yet yielded their characteristic plant fossils occur in Virginia, west of the Potomac river. Near Falmouth and at a few points between that place and Fredericksburg, Va., are clays of the same plastic type and structure as those in Federal Hill.

* McGee: Geology of the Head of Chesapeake Bay; 1888, p. 615.
† Fontaine: Potomac, or Younger Mesozoic Formation; 1889, p. 47.

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They do not agree in composition and structure with the hollow or lens in the streets of Fredericksburg, from which Prof. Fontaine and myself excavated so many fossil leaves, twigs, etc.

The Fredericksburg deposit is, to my view, a structure built at a much later date than the Falmouth clays, and the series of strata to which it belongs has been built within an eroded area. The sandstone member of the Acquia creek region, as seen below Fredericksburg and everywhere else in Maryland and Virginia, is a whole formation higher than the aforesaid clays.

Potomac Formation.—In Maryland this series of beds rests partly on the degraded surface of the crystalline and Archæan rocks. The lowest members thus far observed are dark lead-colored, drab or pale clays, with intervals of chiefly sharp sand, resting in places upon a basal bed of broken micaceous material, often disintegrated into heterogeneous masses or layers, but in other places largely made up of the comminuted or broken fragments of the hard rocks of the vicinity. Upon this rests a bed of sand or sandy clay of variable thickness, followed next above by layers of dark clay which were invaded by cross currents so as to break their continuity throughout a distance of five or more miles.

In Maryland, and particularly in Baltimore and its vicinity, we find a characteristic coarse, angular, whitish sand, sometimes discolored by iron solutions, which rises from beneath, or not far above, tide level, invaded by lumps of kaolin. This sand is usually bounded above by a narrow layer of dense iron stone, varying from two to about six inches in thickness. Directly resting upon this is a distinctly stratified group of dark and drab clay beds, having a total thickness of three to seven feet, parted by sandy layers or by slickenside surfaces at the lines of contact. In these clays, which are in place and continuous through long

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distance, the leaves of plants and trees described by Prof. Fontaine, in Volume XV of Monographs of the United States Geological Survey, 1889, are found, and serve to emphasize the formation. The beautiful *Vitiphyllum multifidum* Font. is, perhaps, the most abundant and perfect of the few dicotyledonous plants discovered in the formation. While the greater part of the assemblage consists of ferns, conifers and cycads of old types, the small percentage of dicotyledons is a marked incident of the flora.

Resting upon these narrow strata is a bed of dark lead-colored plastic clay, which often rises unbroken through a thickness of forty feet; above this it occasionally becomes more sandy, in some places has slender drifts of sand passing through it, and its upper part is generally broken, locally dislocated, and changed by atmospheric agencies into the "Variegated Clays" of Prof. Fontaine. As the formation extends eastward and bayward it becomes mixed and sandy. This sandy portion forms a series of beds adjoining the Albirupean along the stretch of country lying between the Washington branch of the Baltimore and Ohio and the Baltimore and Potomac railroads. In this region the sands of the Albirupean have been mixed with the Potomac clays by overflows of water. These have been repeated in Quaternary time, and the resulting mixtures now form broken beds of reddish or gray color in the troughs between the hills and over some of the ridges.

An erosion interval of great activity followed the deposition of the variegated clays. During this time the huge deposits of dark clay which we know, from Federal Hill as it stood before the civil war of 1861–65, and from other deposits in Howard and the northern part of Anne Arundel county, formed a thickness of fully one hundred feet, was cut through to within a few feet of the present high-tide level. Up to the top of this part of the series, which terminates with the "Variegated Clays," either broken or

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in position, we see a huge pile of deposits, chiefly composed of dense clays. These formed originally an unbroken aggregate of strata stretching ten to twelve miles back from present tidewater, fitting into the hollows of the Piedmont broken crystalline rocks and rising in a few places forty or more feet over their protuberant surfaces. After the deposition of this highly sedimentary series a period of great activity ensued, which covered large areas of this formation with sand, broke up extensive portions of its mass almost to the base, redeposited in strata large tracts of its surface, and left it eroded, trenched, planed off and covered in many places by cross-bedded sands. The whole area forms a belt not more than fifteen miles wide, running from the northeast to the southwest and extending into Virginia southwest of the city of Washington. It is to be noted that in Maryland it includes two sets of iron ore clays, the upper of the two being more sandy, and the ore therein formed in nodules and of poorer quality than in the denser clays beneath.

After the completion of the formation, a period of erosion followed which left deep hollows between many of the hills of clay and along the seaward border especially, carved the hills into low domes, and occasionally stirred the surface into sandy hillocks.

Albirupean Formation.—Over the top of the broken Potomac came the more sandy mixtures of the Albirupean, filling out the hollows, loading the trenches, and, spreading over the summits of some of the clay hills, kept on away back in tongue-like expansions beyond the inner limits of its predecessor. This is especially the sand-built unit of the subcretaceous, non-marine Epoch. This statement must not, however, obscure the important fact that sedimentation alternated with the deposition of the sands and produced clay strata of wide dimensions. It is also important to observe that during the construction of the clay strata

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a Fauna and Flora of more modern type than that of the Potomac occupied the country, and of course gave a different aspect to its features. The Fauna is represented by the remains of crustacean shells resembling those of Cyclas, of worm-bores similar to those of Scolithus, and of shells apparently related to Unio. In the Flora, gymnosperms and angiosperms abounded, but these were different from those of the Potomac, and serve to distinguish the region and its deposits.*

These plant remains have not yet been studied closely enough to establish their precise identity, but we may readily recognize genera closely related to *Cornus*, *Ficus*, *Laurus*, *Myrica*, *Sassafras* and *Phyllites*, besides others less easily recognizable.

The excavations for tunnels and sewers and buildings in and around the City of Baltimore within the last 25 years have brought to light the rocks which underlie this region, and supplied much knowledge with regard to their order of superposition, composition and later modifications.

Prominent among these facts is that which shows this city is underlaid at moderate depths, west of Central avenue, by a nearly continuous bed of steatite and hornblendic gneiss, which is interrupted in the vicinity of Union Depot by an upthrust of diorite. Indeed, in a few places, such as the deep cut on the south end of the Bolton lot, the greenish steatite rock is overlaid by a belt of hornblendic gneiss of the foliated pattern. Farther south in the same tunnel the hornblendic gneiss, and, where this is absent, the steatite rock is overlaid by a bed of quartz schist, of the pattern which formerly rested at the surface in many places near Jones' falls and across the country

* In my former paper, Proc. Amer. Philos. Soc. 1888, p. 52, I referred to this formation—certain marine remains of Encrinites, corals and brachiopods taken out of pieces of white sandstone. These should be eliminated from the description, as they were collected from rocks which appear to have been transported from the North mountain.

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to Gwynn's falls. A few patches of this quartzitic mica schist still remain in the soil of gardens and lots beyond Mount Clare Station and on Peabody Heights.

Summary of Observations.

The literature describing the various details upon which later investigations have proceeded towards a theory of the origin and development of the sedimentary series resting between the crystalline rocks and the base of the Greensand Cretaceous, or true marine, deposits may be found in the publications of H. D. Rogers, H. B. Rogers, T. A. Conrad, P. T. Tyson, J. S. Newberry, C. A. White, W. M. Fontaine, W. J. McGee, N. H. Darton, and the present writer.

The two writers named last adhere to the theory that there is but a single unit of geological structure between the top of the Triassic and the base of the Greensand Cretaceous, or Severn formation of Darton; and to that unit they persistently give the name Potomac formation.

Our own observations, as given above and elsewhere, do not coincide with that view, but point to the conclusion that this complex of beds constitutes at least three structural units, separated by distinct time-breaks which mark periods of transition from one series to the next.

My own belief, as based upon observations in all parts of the field, is that the assemblage of beds cited above is the remnant of a great fresh or slightly brackish water "*Period*," which was built upon the border of the crystalline continent before the salt-water ocean had become established as a fundamental portion of the territory.

This Period is divided into three natural sections by stages of erosive and transportive activity, which greatly altered and partly rearranged the previously deposited strata and beds. The basal member, or **Potomac formation** proper, was laid down upon the broken and hollowed-

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out border of the crystalline rocks, and when complete and uplifted constituted a high ridge of sands, shaly clays and iron ore clays which were capped by a thick body of lead-colored and dark clay, which by being disturbed, dislocated and mixed with ferrous solutions has become the "Variegated Clay" of the present time. Erosive energies from floods and overflows out of the rocky ridges farther inland played sad havoc with the surface of these clays and carved them into reliefs of another order. The more prominent of these reliefs now stand up all along their original belt of deposition as mounds, ridges, terraces and undulations.

Albirupean Formation—Fitting into and around the reliefs of the above formation, and spreading over it in a general northeast by southwest direction, the Albirupean appears, and extends at least from the border of the Triassic region, north of Raritan bay, across New Jersey, Delaware and Maryland to below Fredericksburg, Virginia.

This group of deposits is the most varied and peculiar of all the sedimentary deposits of the Atlantic Coast Region. It includes more different kinds of coarse structures than either of the great adjoining formations. It comprehends an unusual number of kinds of sand of the most diverse orders of structure, and many types of clay equally different in composition. It includes one or two ranges of cobble-stone structures, which seem to have been derived from the innumerable pot-holes that formerly existed at the foot of the thousands of cascades everywhere present in the beds of streams current through the crystalline hills and mountains next inland.

This formation is locally invaded by narrow areas of cross-bedded sands, usually placed on the northern end of a ridge of the argillaceous material. These cross-bedded deposits occupy troughs of erosion, and have their wedge-shaped end placed against the side of the hill next its

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summit. Lenticular beds, either short or long, composed of the clay and drifted material of the adjoining region, have caught and held the sands, clays, lignite, stems, leaves and seeds of numerous varieties. Here are to be found also lumps of clay and the fossils washed out of older deposits belonging to the preceding formation.

To the Albirupean I would refer the entire series of clays, sands, sandy clays, white and pale sandstone and the cobble-stone deposits and lenses of sedimentary materials resting between the top surface of the "Variegated Clay" and the base of the Greensand Cretaceous or Severn formation.

Alternate Clay Sands.—This group of sediments is remarkable for the thick series of thin layers of clay and fine white sand, including sometimes thicker beds of both the clay and sand, and for a thick stratum, or line of beds, of black argillaceous marl, placed at or near the top of the group.

This group is a unit of structure, resting upon the irregular and eroded surface of the pale or white clay, or sand, of the preceding group, or first recorded series of the Albirupean. All of its clays are more or less fossiliferous, and the great black bed is in some places crowded with the remains of trees and plants. It is not now possible to give an extended list of the fossils, but from all the exposures of these beds hitherto examined, either in Maryland or New Jersey, the same genera and species of fossil plants have been obtained.

The time-break between the Alternate Clay Sands and the underlying group of the Albirupean is far less extensive and profound than that at the close of the Potomac formation, but it is distinct and will later reveal its more complete significance.

After the close of the Alternate Clay Sands Series, active erosion, accompanied by dispersive and distributive forces,

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cut away the inner border of the Albirupean Black Marl and made an inland trough, now partly occupied by Raritan bay, the Delaware river, Chesapeake bay and the Severn river, etc., while the adjacent country is now extensively occupied by several of the beds belonging to the Greensand Cretaceous formation.

The bottom of the basal member of the Greensand formation, in New Jersey, where present, as near Cheesequakes creek, is signalized by a thick, stony, ferruginous crust, charged with the remains of fossil shells. The shells are generally eaten away, so as to leave a hollow mould where they formerly existed. But occasionally enough of the shell remains to serve for identification. It has accordingly been possible to recognize *Ideonarca vulgaris* Morton, *Ostrea larva* Lamark, and an *Axinea* allied to H. *alta* Whitf.

From the foregoing observations it will be seen that a great, and long extended, and wonderfully varied complex of sedimentary formations, older than the Greensand Cretaceous and younger than the Triassic, composed a period in the history of the seaward border of the Atlantic region in late Jurassic, or early Cretaceous time.

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THE BLACKBURNIAN WARBLER,

Dendroica blackburniæ, Gmelin, as a summer resident.

By Arthur Resler.

On the 28th of July, while on one of my ornithological rambles through the woods in Howard county, about twelve to fifteen miles south-west of Baltimore, I obtained a specimen of the beautiful Blackburnian Warbler, from the topmost twigs of a tall oak tree. It was flying and fluttering between the leaves, evidently in pursuit of insects. Owing to the restlessness of the bird, it was brought down with difficulty. It proved to be a young male, differing but slightly from a young one of the same species which was secured on the tenth of October.

While there is nothing remarkable in the occurence of this bird here during the period of migration, it seems worth while to record the capture of this specimen, since it is essentially a summer resident of the Northern States and Canada. The occurence of a single specimen does not afford proof that the species is a summer resident; but it opens the question as to whether it is not an early migrant. For example, it is true that I have found, toward the close of August, the Black-Throated Blue Warbler, (*D. canadensis*), the Black-Throated Green Warbler, (*D. virens*), and a young female of the Mourning Warbler, (*Geothlypis philadelphia*); all of which, besides numerous waders and shore birds, migrate more or less numerously from late in September until the middle of October. But that a bird which migrates annually from late September until near the middle of October should begin to retire South in midsummer, even though young, is certainly a remarkable fact which claims our attention.

It may be not amiss to mention that for almost a week before the capture of this specimen, the maximum temperature ranged from 95° to 96°. Hardly an inducement was

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thus offered for either bird or man to leave the more northern and cooler place of abode for one so torrid. During migration, this species is not uncommon in company with different other warblers which frequent high woods. In such places, I have usually found them during the first two or three weeks in May, and again in the fall.

The stomach of this bird was completely filled with insects, as far as it was possible to determine, and which were coleoptera, apparently *Tenebrionidæ*, besides the large larva of another kind of beetle.

A STUDY OF GAY HEAD, MARTHA'S VINEYARD.

By P. R. UHLER.

Next the south-western extremity of Martha's Vineyard rises a high pile of clays, sands and rocky materials, forming the once detached end of a prominent ridge which bounds the western side of the island. The north-western extension of this prominence is called Gay Head, from the conspicuous colors of numerous radiating beds of yellow, red, white, black and green which cross the face of the bluff. This much disordered, but highly instructive headland has not yet received the attentive study which it deserves. It has likewise been seriously misrepresented, and its structure much misunderstood. Part of a summer vacation spent there has opened out to my view a series of most unexpected facts relative to the geological history of this region. At Gay Head, especially, the writer was enabled to examine in considerable detail the section back of the slipped clays, sands and mixed materials which cover and disguise the face of the bluff, and to recognize the formations in their actual positions. The following statements will indicate the geological series which exist there, and the order of their superposition.

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On the top of the hill, forming the surface on which the light-house stands, is a thick bed of fine, pale, loose sand, varying in depth from place to place. It may be said to vary from ten to twenty-five feet in thickness. Boulders of granite and other rocks, both large and small, lie embedded in it at intervals. Below this is seen two to three feet of a loosely bedded, very fine, dark gray sand. Next below this occurs gravel, boulders, broken rocks and a bed of pudding stone, or conglomerate, resting in sand, gravel, and gritty material, either rounded or angular. This pudding stone member is scarcely more than two feet in thickness, and it varies from a whitish gray to a brown or dark liver color, according to the kind and degree of iron staining which it has received from the material resting above it. The conglomerate as well as the looser and more sandy portion of this member holds a few shells of mollusks, teeth of *Carcharodon*, and some vertebræ and other bones of *Cetacea* belonging to the Miocene Period. Apparently this complex of most mixed materials is about five feet thick in the western part of the section.

Below this, facing Vineyard Sound, occurs a ferruginous sand, in broken patches, now only a few inches in thickness, which is all that remains in place of the fan edge of a bed of Cretaceous greensand, belonging to the Lower Marl of the New Jersey surveys. The outer end of this stratum, which was eight to ten feet thick at a distance of about eighty feet from the inner face of the present bluff, now lies overthrown against the steep slope, and partly stands on end, in nearly upright position. It appears best in three principal exposures which rest upon buttresses running down and out from the cliff. On the east and south sides of the range of cliffs this formation fails to appear; although the beds on that side of the ridge are not so much dislocated as on the west. This greensand marl is much altered above by iron solutions, and considerable patches

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of the mass have been thrown about in breaking apart, and remain as brown sand spread along the lower levels. The greater part of this marl has been mixed with the deposits of other series. It is distributed in chunks and small pieces through the surface of the vari-colored clays which form the base of the section, and it is, in places, thickly studded with gravel and broken stones which have fallen from the Quarternary beds near the summit of the hill. Here and there the bones of Miocene cetacea, fragments of shells, and the teeth of the *Carcharodon* are found sticking in the surface; but deep in the body of this material are the fossils which establish its proper age. Three feet beneath its surface the writer has met with distinct casts of *Exogyra*, *Gryphea* and *Cucullea*, coprolites, bones of reptiles, fragments of chelonians, and teeth of the shark *Otodus*. The component elements of this marl agree precisely with those of the Lower Marl of New Jersey and Maryland, and like them have a nearly horizontal arrangement of particles, which is visible in the plane of bedding. A line of fossils in the body of the most westward of these long beds coincides with the sloping direction of the heap, and helps to show that slipping rather than overthrow has determined its present position. This marl also rests, as in the States above mentioned, directly upon the white sand of the Alternate Clay-Sand series. This series is the upper group which has been placed by New York geologists as a part of the Amboy Clays, but which we now find to be laid down unconformably upon the Woodbridge and Amboy clays in New Jersey, and upon the Variegated Clays in Martha's Vineyard.

It therefore seems necessary to designate this sharply separated group by a name as the *Raritan Formation*, from the river upon the shores of which it is so extensively and typically exposed. It covers a very irregular stretch of surface and varies in base-level according to the thickness

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of its deposits, or the elevation of the beds and domes of clay upon which it lies. It stretches out north-east through Maryland, New Jersey, and a part of Long Island, in a belt rarely more than three miles wide, but usually having a width of not much more than one mile. It is cut apart by the rivers and bays which traverse the region where it was laid down, and it has suffered from local erosion in many of its larger divisions. The superimposed drainage of its surface, represented by numerous rivulets, creeks, and rain troughs, now dried up or only occupied by small swamps or cranberry bogs, was directed eastward, and probably entered a series of landlocked sounds and bays extending along the coast of the mainland. These bodies of water might have been brackish, but none of their sediments have yielded organisms which belong to salt water such as that of the sea. This formation belongs specifically to the type of freshwater deposits, carried from the mainland through shallow drains out to the broader water, and dropped there around the older clays which formed islands and headlands after the close of the Potomac Period. The material, consisting first of coarse, chiefly angular sand, later of argillaceous sediment charged with vegetable remains, was distributed by rapidly moving waters, which seem to have successively risen and fallen, so as to deposit alternating thin layers of clay and find white sand, enclosing the lignifying woody drift. Pyritous nodules and coatings around lignite abound in many parts of the carbonaceous sandy clays; and the filmy residue of leaves, together with twigs and seeds, occur in the laminæ and layers of the firmer clay members. Leaves of a *Sapindus*; *Eucalpytus geinitzi* Heer; *Liriodendron simplex* Newb. *Sequoia ambigua* Heer, and a *Sassafras*, besides many unrecognizable forms of leaves, were found by the writer in the layers of the alternating clay on both the west and the south-west faces of the Gay Head cliffs. The specimens

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obtained from the south side, and resting in undisturbed beds, were found in fairly good condition, with enough of their outline and venation to establish their agreement with the forms above cited; while those collected from the west side exposures, being included in a shattered and less coherent matrix, were almost too friable to be touched.

The section on the south-west face of the cliff is covered from top to bottom by the white sand, which has been washed from above. Its beds are all in place, nearly horizontal, and form a very steep exposure (apparently of about 70°), abutting against the high ridge of variegated, partly red, clay on its south-eastern flank, and likewise resting upon the base-levelled surface of the same body of clay. On the west face of the cliffs, this same group of alternating beds forms three widely separated buttresses upheld in nearly original order. The erosion of their sides has cut them into almost vertical crests, projecting from the body of the ridge; while the intervening material has been trenched by heavy rains, and perhaps melting snow, and partly carried away by the surf of Vineyard Sound. The base and lower parts of all of these is covered and disguised by material washed or dropped from the upper beds; but they all rest upon the degraded surface of the variegated clay.*

The best preserved section, that of the south-west face of the cliff is composed as follows, in descending order:—

Ten to fifteen feet of coarse, kaolinic white sand, gray within, composed of disintegrated granitic rock.

Three to five feet of fine plastic drab clay, massive in part.

Twelve to fifteen feet of the alternating block and lead-colored lignitic, partly laminated, clay in narrow layers, parted by thin seams of fine white sand. Highly fossiliferous.

* Since preparing the first part of this paper my attention has been called to the fact that my friend, Mr. David White, was the first to place on record the discovery of veritable Cretaceous fossil plants at Gay Head and other places in Martha's Vineyard. See *American Journal of Science*, 1890, vol. 39, pages 98-.

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Two or three feet of white sand carrying streaks of white clay, stained in places with iron solutions.

Two or more feet of coarse brown sand, partly indurated into sandrock.

The entire section is about fifty feet thick, and it is overlaid by the sands, gravel and small boulders of the Miocene, or Quaternary, Period, followed up to the surface by fine pale sand.

This group of deposits has been laid down here around the figure of a relief of the variegated clay, and consequently is unconformable therewith. It does not seem to pass over the summit of the clay at this point, which apparently rises about ninety feet above the low beach. But over the lower hills, near Menemsha pond, it passes towards the east, and is lost beneath the covering of sand.

On the western side of Gay Head, this group of strata seems to have been carried away from a large area north of the wharf, before the sand was deposited which now forms the general covering of the surface. The overthrown members of this series cover thickly a large part of the eroded face of this side, and fill in wide spaces against the gullies which have been dug by the drainage during storms of rain. These strata form the most loosely connected and least coherent parts of the hills, and, accordingly, they would be the first and most to suffer from undermining by rain water gliding over the incline of smooth clay, and with breaches at intervals pointing seaward. One of the most disturbing factors in bending and breaking the strata here has been the percolation of water in that part of the hills on the slope of the inner core of clay. This clay is the most resisting part of the whole body of the ridge, and its seaward edge has been torn up by the activities of the modern ocean.

On this side of the bluffs, the lead-colored plastic clay is found beneath the beach at numerous places, and in

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general it is seen in exposures rising only from three to five feet above average tide. But wherever it has been disturbed by erosive agencies, its surface is broken, and changed to the many colored variegated clay used by the Indians to construct their pottery.

As no fossils have yet been identified from this deposit of clay, it is not possible to correlate it precisely with that of the Amboy and Woodbridge type, or with the true "Variegated Clay" of the summit of the Potomac formation. It is massive, and shows but few indications of stratification; and none of its exposures yielded to me either fossil leaves or seeds. In texture it is much like a lead-colored clay in the Woodbridge region; but it also resembles the Potomac clay in the upper part of Federal Hill, in Baltimore.

Whatever may be the exact position of this clay in relation to the Potomac formation, it occupies the horizon of the lower Cretaceous deposits, and by the now known position of the two series which overlie it, no correspondence can be admitted between it and the Eocene parti-colored clays of the Isle of Wight.

As we have remarked above, this once thick sheet of plastic clay has been profoundly eroded on its eastern side, but small areas on that side, as at Nashaquitsa and vicinity, have been left as monumental remains, to be still further degraded by the sea and rain. Multitudes of small exposures of the pale upper part of this clay occur at intervals all the way from Gay Head to near Cottage City. The whole island of Martha's Vineyard is no doubt underlaid by this deposit. By reason of its type of denudation, it forms a sinuous axis for all the succeeding beds on the western half of the island. While on the eastern side it supports chiefly the glacial and modern deposits on its base-levelled surface.

The structure of the Gay Head terrane admits of no

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explanation as the result of mountain building movements. Its unbroken axis is a stiff, although uneven, ridge of massive clay. Upon and against this have been built far less coherent strata of sand, sandy clay, lignitic clay, narrow belts of plastic clay, and a heavy stratum of disintegrated rock, in the condition of moderately loose sand. Ignoring the local bed of greensand marl, we find next above its level a bed of coarse gravel mixed with sand, in which piles of boulders contribute to the immense weight. Over all of this is heaped up a thick body of sand, which bears on its surface, especially upon the ridge, numerous granitic boulders, each of many tons weight. Possibly all of this material above the granitic sand constitutes an average thickness of twenty feet.

Such an enormous load of heavy material, accompanied by the thrust and pressure of ice-bergs driven over the surface and stranded at intervals, even if an extended glacier did not exert its energy upon this weakly consolidated elevation, might well have disturbed the poise of its upper beds, and opened clefts to the attacks of the rains and the frosts. A small amount of faulting has occurred within recent years, evidently occasioned by the downward pressure of the upper beds. Cracks, like the most landward of the successive series present on the upper surface of this promontory, are common on many parts of the cliffs of Chesapeake bay, and when these are attacked by the thaws and rains of early spring, they open widely, and either precipitate the outer portion upon the beach, or start it to sliding down the slope. Where such exposures are open to the storm-driven surf, the cliffs are undermined, and the overlying material either slides or falls according to its steepness and tenacity.

All of the strata below the greensand marl, that are found in the Vineyard Series, occur more or less flexed in New Jersey and Maryland; but in no locality, thus far

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examined by the writer, do they present upturned ends overspread by succeeding formations. The woodcut illustration, given by Prof. Edward Hitchcock, in his Report of 1841, although rough, sufficiently outlines the Gay Head cliffs. It shows that marine erosion was one of the chief factors in opening the beds vertically. Since then, diagonal dislocations and slides have given the positions of the seaward ends as they now exist.

The Raritan formation, defined by the writer, in previous papers, as the upper member of the Albirupean formation, and designated as the Alternate Clay-Sand Series, has, by reason of later investigations in New Jersey and on Martha's Vineyard, proved to be well separated from the contiguous formations. It is in fact more sharply separated by broken lines in the underlying deposits, and by a change to marine sediments in the overlying beds, than we have found to exist between the Miocene and Eocene, or the Eocene and Greensand Cretaceous formations in the adjacent tracts of country.

If the Raritan once formed a part of the Amboy Clay Series, we might expect to find evidences of direct continuity between it and the underlying clays. Such, however, appears not to be the case. Instead of continuity we see an erosion interval. There is no agreement with other series in the extension of the strata; and there is such agreement of plan throughout its whole long stretch that it forms a consistent unit of structure. The fact is evident, also, that this formation has suffered greatly by denudation and erosion. Large tracts of its mass have been carried from its surface, and bayed-out excavations extend to near its base level in terranes such as may be seen at Bordentown and Kincora in New Jersey, and on the Severn, Magothy and Elk rivers in Maryland.

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ON THE DISTRIBUTION OF CORDYLOPHORA IN THE CHESAPEAKE ESTUARIES, AND THE CHARACTER OF ITS HABITAT.

By Arthur Bibbins.

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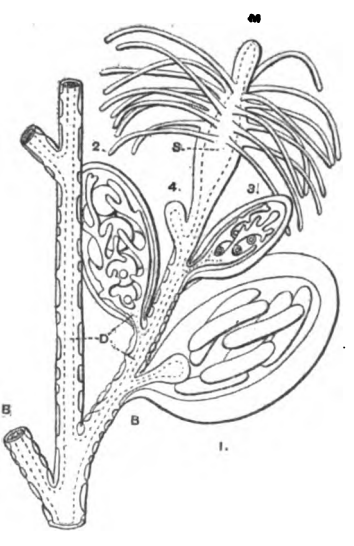

Fig. 1.—Cordylophora lacustris Allm.♀ (after Schultze).

A, portion of stem. B, branch bearing one (terminal) hydranth and four gonophores, 1–4, containing ova in various stages of development. The ova of the youngest, 4 (gonophore bud), are not yet visible. Those of the oldest gonophore, 1, have been fertilized, and have become converted into planulæ. D, digestive tract and diverticula of same. M, mouth. S, stomach. (x 15).

Two years ago Professor W. K. Brooks suggested to me the need of some experiments to determine by what means our brackish water hydroid, Cordylophora,* could best be kept in normal condition in laboratory aquaria.† While occu-

* Probably *lacustris* Allm. (2). The best drawings have been made by Schultze (6). The outlines of a portion of one of his figures (6, Pl. IV) are reproduced in Fig. 1 of this paper.

† An account of my results will be given in a separate paper in connection with some morphological and physiological notes.

December 5.

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pied with these experiments, I became so much interested in this curious and beautiful animal that I have been drawn somewhat beyond the point to which I first intended carrying my investigation.

It seems to me that there are a number of good reasons why a thorough knowledge of the structure and habits of Cordylophora is desirable. Among these should be mentioned the fact that this form constitutes an admirable type with which to introduce the young zoologist to the study of hydroid morphology and physiology (cf. 1. p. 181), especially at points like Baltimore, Philadephia, or Washington, where the living oceanic hydrozoa are less easily accessible.

Certain of my experiments lead me to believe that Cordylophora may easily be transferred from our estuaries far into the interior (cf. 4. p. 709), and kept alive for several weeks, at least, in aquaria of brackish water artificially made. This would render it possible for inland students to study this interesting form alive, which would greatly stimulate their interest in, and serve to clear up their knowledge of, a group, which, in the interior, has its only representative in the fresh-water hydra.

Though I have given considerable time and attention to the collection of the data contained in the following pages, the study has been of the nature of a recreation. I trust, however, that the facts presented may not be less useful for having been acquired chiefly during a series of pleasant outings.

The first locality in the Chesapeake basin of which I have seen printed notice, was observed in 1877 by Professors Uhler, Brooks, and S. F. Clark (9, p. 32), near the mouth of Curtis Creek. This, however, was not the first observation of the hydroid in these waters, since Professor Uhler informs me that when a boy he used to fish

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in Furnace Branch*, near the "old furnace," and had repeatedly noticed these moss-like creatures attached to the submerged fragments of slag from the furnace, which lay near the shore. For several years young zoologists have been making excursions to this latter haunt of Cordylophora as about the only one definitely known in the region of Baltimore.

The point from which visitors of the Furnace Creek localities have usually obtained specimens is at the mouth of a small southern tributary of that estuary, which flows into the latter, about a hundred yards below the old furnace. Among the residents of the section this inlet has taken the names "Cinder Cove," or "Bat Cove," owing, I judge, to the fact that across its mouth, which is only about twenty feet in width and two feet in depth, a quantity of fragments of brick and slag from the old furnace form a rude dam or bridge, upon which one may cross the cove at low tide, and which for convenience of reference I will designate as Cinder Dam (Plate II, foreground).† This structure at this date consists of an irregular mass, fifteen feet in length, eight feet in width, and two or three feet in depth. At the north end a narrow and relatively deep channel has been eroded (Plate I) through which, during ebb tide, the water with which the reservoir-like cove has become filled during flood tide, flows out with considerable rapidity,—the bridge forming a sort of tide-dam. From the time when I first saw this dam, nearly four years since, it has not been materially changed in form or dimensions. Many of the constituent fragments of slag are large and of very

*Also called "Furnace Creek,"—the principal western tributary of Curtis Creek. On its south bank, one-half mile below the head of tide, stand the ruins of a colonial iron furnace (shown in Plate I, upper left-hand corner).

†The Maryland Academy of Sciences, with Mr. Quartley (photographer), and the Deutsch Co. (lithgraphers), of Baltimore, have warmly seconded my attempt to obtain a view of this original Chesapeake locality for Cordylophora, which should not only exhibit the chief physical characters of the animal's habitat at Cinder Cove, but which should do ample justice to its singularly picturesque surroundings.

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irregular shape, and the spaces between them form numerous dark or shaded recesses, which, during at least half of the time, remain submerged in brackish water, and through which, during ebb and flood tide, its currents flow. Within these recesses, attached to the fragments forming them, the colonies may always be found.* During the spring, summer and autumn months they are also seen upon the exposed surfaces of the dam, upon isolated fragments of slag and brick lying upon the bottom of the stream, and, as also observed by Clark, in Curtis Creek (9, p. 32), attached to the stems and leaves of various species of brackish water plants.

This habitat appears, on the whole, to be the most favorable of any that I have yet observed. The water, both of Furnace Branch, and the smaller branch which flows into Cinder Cove, is nearly always very clear. Usually its saltness is but slightly perceptible to the taste, though, like the Patapsco at Baltimore, ctenophores and barnacles are found in it. The dam is located far enough inland so that its constituent fragments are never disturbed by surf. The branch flowing into the cove drains but a small, densely wooded basin, so that the dam is never seriously molested by freshets. The spot is well protected from cold winds by adjacent banks and forests. The surrounding region is but thinly inhabited, and the spot is rarely visited, except by an occasional fisherman, huntsman, naturalists, or stroller. The colonies are, therefore, left to grow and multiply in peace.

One feature of this habitat would seem to be unfavorable, though the effects of such disadvantage, if present, are not noticeable. As is well known, the tides of these estuaries are strongly influenced by the winds. During strong and prolonged easterly winds I have seen the north bank of

* They were first observed among the fragments of this dam by Drs. E. A. Andrews and C. F. Hodge, of Johns Hopkins University, Nov. 19, 1887. Dr. Andrew states that his attention was first directed to this locality by Mr. Uhler.

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the cove submerged, at high tide, to a depth of one foot or more, and after prolonged westerly winds I have seen the tide-water retreat, at low tide, several yards from the foot of the dam, leaving many of the growths for several hours exposed to the atmosphere. Indeed, at the average low tide, when the wind is quiet (Pl. II), many of the growths are thus exposed. Were it not for the fact that while thus exposed they are kept moist by the (more fresh) water of the tide-pond, and of the branch which flows into it, which continues to pass through the above described lateral channel (Pl. II), and by the water retained among the lower recesses of the dam, they would soon become exterminated through the effects of desiccation.

Within the recesses of the dam the colonies are usually best developed. Even during the winter months, when the cove contained ice, I found that the stems in the more remote recesses still bore hydranths. Several advantages would seem to be gained by living in these recesses, among which should be mentioned the protection which they afford from the ice, snow, and extreme cold of the winter months; and during the summer from the dry atmospheric currents which would tend to carry away their moisture while above water. From the deep shade or darkness of these recesses at least three advantages would be gained: first, protection from enemies which might tend to prey upon them. I doubt, however, whether the adult Cordylophora is in serious need of defence from enemies beyond that which is afforded by the nettle cells of its tentacles. I once placed some Mud Dabblers, which were strangers to Cordylophora, in an aquarium with the colonies, and watched their attempts to crop the hydranths. As soon as their mouths came in contact with the tentacles, the fish darted away as though in pain. I cut off a hydranth and dropped it into the water. It was immediately seized by first one and then another of the fish, only to be instantly

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expelled from their mouths with unmistakable signs of discomfort. In no case did I see a dabbler swallow a hydranth, and they soon learned to avoid the colonies. During the planula stage the darkness of the recesses may be of some advantage in hiding them from organisms, which might tend to devour them. The shade would also protect them from the direct rays of the hot summer sun, and, as already mentioned, would tend to retard the evaporation of moisture from the stems while above water, and thus prevent destruction from desiccation (cf. 7. p. 254, also 8, p. 26, note).

No break in the continuity of the Furnace Creek colonies has, to my knowledge, been observed from the time they were first seen by Professor Uhler. This observer states that on one occasion he was unable to find specimens of the hydroids at Cinder Cove, but he tells me that he only looked over the surface of the dam and did not examine its interior recesses.

It is to be hoped that persons who may visit this locality for specimens of Cordylophora will not more than necessary molest the colonies which are attached to the dam, for this is the only point near Baltimore yet known to myself where the fully expanded hydranths can with certainty be obtained at any season of the year whatever.

Owing to the fact that the Cordylophora of the Chesapeake was only known to inhabit stations near the heads of estuaries where the fresh water of the branches mingles freely with the tide water (v. 8, p. 32; cf. also 5, p. 113), the impression has to some extent prevailed that the animal was practically a fresh-water species (cf. 7, p. 353), but we shall see that it is able to flourish in water having a decidedly salt taste. I have yet made no careful search for the hydroid in water known to be entirely fresh. I once transferred some vigorous colonies from Cinder Cove to an aquarium of aspirated hydrant water, and at the same time others to an aquarium containing brackish water. The former, unlike the latter, soon began to degenerate, and lived but a short time. Dr. Andrews aptly suggests that one might be able to teach them to live in fresh water by passing them slowly through intermediate grades.

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I was led to look for Cordylophora in the PATAPSCO by the fact that Cinder Cove specimens lived about as well in the aquarium containing tide water from this estuary at Baltimore as in that containing water from their native estuary. The suspicion of their occurrence at Baltimore was strengthened by the fact that both in Europe (**6**, pp. 43–5) and in the United States (**5**, p. 113) the colonies have most often been found in the vicinity of seaports situated upon estuaries, at points where the salt of the tide-water is scarcely or very slightly perceptible to the taste (which is usually the case with the Patapsco in the vicinity of Baltimore), whither doubtless they are distributed by vessels (cf. **7**, p. 253). January 30, 1891, Mr. G. C. Price and myself visited the docks of Locust Point, hoping to find the colonies there. We examined the piles of the wharves at several apparently favorable points near Federal Hill, with a negative result. On the Patapsco side of Locust Point, however, we were more successful. Near the site of old Fort Covington (immediately above Winan's cove) stand at this date four long docks, now mostly out of use, but formerly connected with the oil yards (several years since burned) of S. Fancher & Co. At this point the water of the Patapsco is tolerably clear, except after heavy or prolonged rains, when it is somewhat clouded by the wastings from the fine clays in the lower portion of its basin, and during the warmer periods of the summer months, when it is contaminated somewhat by the drainage of the city. The average depth of the water at the bank is at this point about four feet. Here the surroundings appeared somewhat more favorable for the growth of the hydroids, and we found them on the piles of the break-water of the bank at every point examined below low tide mark.

I visited this locality from time to time until late in April, when I observed the appearance of gonophores.

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During the early days of May the colonies were found in excellent condition, but when I examined them on the 22d of that month I noticed that they were not as vigorous as before. The water was beginning to show the impurities derived from the city, and the stems of the colonies were becoming loaded with Vorticellae. In July I found that over all of the piles, where I had earlier observed flourishing colonies of Cordylophora, dense and beautiful growths of Bryozoa, which were so thick that I could peel large mats of them from their base of support. Only an occasional stem of Cordylophora could be found which had not been crowded out by its molluscoid rival. Late in September, and again on October 25th, I was unable to find any trace either of the hydroid or the bryozoan.* October 30th I visited the Cinder Cove colonies in order to determine whether they too had disappeared, but found them unchanged.

Last June my nephew found some good specimens of our hydroid attached to the sides and lower surface of a small floating dock at Flood's Landing, Spring Gardens. These colonies, like those at Fort Covington at a similar date one year previous, were being crowded out by dense growths of Bryozoa.

On the 26th of March, 1891, I visited the old so-called Shell Wharf, at River View, in search of colonies. This dock lies immediately below the new Northern Central elevator. Near the outer end of the dock, on its eastern side, I found a pine board nailed fast to the same and projecting vertically several feet into the water. The board was well worn, and had evidently been in this position for several years. I pried it loose, and found upon its

* Last May I found the Fort Covington colonies again in good condition. That this temporary disappearance was due to the presence of certain elements in the water near the city, which were either directly injurious to them, or indirectly so through the undue nourishment of their competitors, is suggested by the fact (later to be mentioned) that several miles below the city the colonies persist throughout the summer and autumn months.

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landward surface, two feet below low-water mark, a few stems resembling those of Cordylophora. I transferred them in a jar of tide water to the aspirated brackish water of my aquarium, and in the course of a week several good hydranths had made their appearance. Their habitat at this point is considerably different from that at Fort Covington. The water is much deeper and more clear, and the colonies exposed to more violent waves.

I made but slow progress in finding new localities for Cordylophora until I had devised a species of hand dredge furnished with a long handle (Fig. 2), with which I was able to reach down from a boat or elevated dock to a depth of several feet into the water and gather whatever might be attached to the sides of piles, piers, etc. With the aid of this I found most of the localities described below.

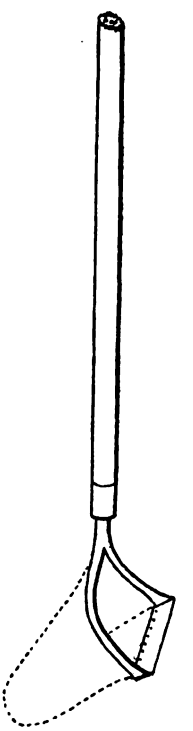

FIG. 2.—Hand dredge.

The dredge proper consists of a ¾-inch wrought iron shank set firmly into a stiff, oak 12-foot handle, and having two divergent ½-inch arms which are slightly curved forward. The extremities of the arms are joined by a thick, moderately sharp 4 by 1¼-inch cutting blade, set at an angle of 45° with the handle. The back of the blade contains a row of perforations which, with the arms, serve for the attachment of the net.

Following the example of Kirchenpauer, who found Cordylophora upon the buoys in the mouth of the river Elbe (**3**, p. 283), May 22d, 1892, I began an examination of the buoys of the Patapsco. I visited several between a point opposite Fort McHenry and Light street bridge,

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but found, at this particular time, only dense growths of algæ attached to a depth of five feet. The buoys which I examined, however, were comparatively new, and possibly the colonies had not had sufficient time to become established. Doubtless they will be found upon the older buoys, especially those farther down the river.

Early in July last I conducted an excursion for the classes in biology at the Woman's College of Baltimore to Fair View, at the mouth of Rock Creek and near the mouth of the Patapsco. Here I hoped to show them the habitat of this our most accessible tubularian hydroid. Through the courtesy of Professor Uhler, I had previously visited this point, and thought it highly probable that we should find the colonies there, and the first dip of the hand dredge fully justified our expectation.

We then concluded that the colonies probably existed at Fort Carroll, and directed our next excursion to this point. As anticipated, we found them here also, and they proved to be the finest growths that I have yet seen. The granite foundation of the pier, as well as the wooden piles of the dock, were thickly covered by the colonies at every point examined. On many of the piles they were found even at a height of six inches or more above the low water level of that day. The growths thus exposed to the atmosphere were kept constantly saturated with water by an occasional wave which rose high enough to drench them. They were found well developed at points most directly exposed to the waves, which, during high and prolonged easterly winds, beat against the fort with surprising violence. The most luxuriant growths, however, were found upon the piles far beneath the wooden dock in places somewhat protected from the waves.

Here we also made an observation bearing on the vertical distribution of the colonies. With the hand dredge I gathered them from the foundation of the pier from a

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depth of twelve feet, and while dredging in the adjacent channel, thirty yards northeast of the pier, at a depth of twenty feet, a few stems of Cordylophora (bearing hydranths) attached to oyster shells were brought up.

I visited the Fort several times later in the summer, and again late in September, and on every occasion found the colonies in good condition, and bearing gonophores.*

I have made no observations farther down the Patapsco than Fair View, but we shall later see that there is good reason for believing that the colonies exist not only at the mouth of this estuary, but in the upper portion of the Chesapeake Bay proper, at least as far southward as Annapolis.

Only one estuary north of the Patapsco has been visited, viz., Back River. In the spring of 1891, Mr. Price and myself examined the supports of the Philadelphia and Wilmington railroad bridge, also those of the Eastern Avenue bridge, with a negative result. At that date the waters were, and had been for a considerable period, much clouded by washings from the railroad cuts and embankments near the head of tide-water. This circumstance, together with the fact that comparatively few large vessels (which, as already suggested, are probably an important dispersing agent for the species), enter this estuary, discouraged further search in its upper waters.

I am informed by Professor Basil Sollers that in 1889 he found Cordylophora in the Magothy, attached to the wooden supports of the so-called New Bridge, which spans the estuary of this river about one mile below the head of tide. He also found colonies attached to the submerged stems and leaves of certain aquatic plants growing near the bridge. Early in August last, while members of my classes were studying the development of the oyster at the

* On Nov. 12, however, it was found that the hydranths and stems of the colonies had mostly disappeared.

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Magothy, I took occasion to examine the piles of the landing at Arnold's fishing shore, as carefully as I was able, without the aid of the hand dredge. This landing is situated on Dividing Creek (one of the southern inlets of the Magothy), one-half mile from the river proper. This locality presents conditions apparently favorable in every respect, and though no colonies were found I believe that a more careful search will reveal that they are present at this point or in this vicinity.

During the fall of 1891 I visited Round Bay in order to see whether I could find the colonies in the SEVERN. Various submerged objects in the vicinity of the landing and along the north bank of the river, as far as the Kerr's sand quarries were examined, but none were found. In rowing down stream toward the landing I examined several points along the south bank with the same result, until I came to the old wrecked schooner which lies, with its stern submerged, in the mouth of Valentine's Creek, a few rods from its west bank. Growing upon the starboard, near the bow, five feet under water, I found a few good stems of Cordylophora, bearing hydranths. It is interesting to note that here we have the colonies growing in the same water with the oyster.

I have not had an opportunity of making a careful examination of any locality in the PATUXENT. Judging from what I have seen of the tide-water at Nottingham I should expect to find Cordylophora at least as far up the river as this point.

During August, 1891, while engaged in making palæontological collections for the Johns Hopkins University from the POTOMAC basin, I made the following incidental observations: Various submerged objects at Pope's creek were examined, with a negative result. At Mathias Point Landing (Woodstock), Virginia, I found colonies in good condition on the piles of an old dock, several rods above

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the one now in use, four feet beneath the water. I also examined the piles of the old wharf at Split Rock (between Potomac and Aquia creeks), Virginia. Here I was not able to find a single specimen. I thought it might be due to the fact that the channel of the Potomac in this region lies well toward the Maryland side, being separated from this old landing by flats two miles in breadth. Colonies thus widely separated from the course of the larger vessels, when once destroyed, which at this exposed point might easily happen, would not quickly become re-established. The hydroids may have been absent from some unknown cause at this particular season (cf. p. 220), but this is rendered improbable by the fact that on the following day I crossed the Potomac to Clifton Beach, and there found flourishing colonies on the older piles of the landing. The most northerly point in the Potomac at which they were found was Fort Washington, Maryland. On the same day that I saw them there, I examined the docks at Alexandria, Virginia, which is about six miles further up stream, with a negative result.

Judging from what I have seen of the tide-water of the RAPPAHANNOCK, I should not expect to find Cordylophora farther up this estuary than Port Royal, and I should confidently look for it at Tappahannock. The tide-water at Fredericksburg, as recently observed in passing over the Aquia Creek and Fredericksburg railroad bridge, appears, like that of the James at Richmond, to bear too much sediment for the health of the colonies.

Early in the present month my brother and myself found Cordylophora growing in abundance on the supports of the docks in the YORK at West Point, Virginia. Here the saltness of the tide-water is very decided, and near at hand are the well-known York River salt-water oyster beds. The occurrence of the colonies so near the mouth of the Bay was a matter of considerable surprise to me, for I have

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gathered true oceanic hydroids from the shells of oysters taken from the York only a few miles below West Point (cf. 4, p. 108). This fact leads us to look for our hydroid in the upper CHESAPEAKE proper at least as far south as the mouth of the Severn. The most southerly landing of the Bay (and the only one), which I have had an opportunity to examine with care, is that at Plum Point. Nov. 2, 1891, Mr. H. W. Britcher, of the Johns Hopkins University, and myself made a thorough examination of the older supports of the outer end of the landing, with a negative result. As already suggested (p. 220) this does not signify that the colonies were not present here earlier in the season.

In July, 1890, Mr. N. H. Darton, of the U. S. Geological Survey, and myself rowed down the PAMUNKEY from a point opposite Hanover Court House, to West Point. At that date I did not suspect the presence of our hydroid in the estuary of this river. But if its water is usually as clear as it was at that season, which I judge, from the proverbial clearness of the York, to be the case, I should expect to find colonies very near the head of the tide, twenty miles above West Point.

Early in the past summer, Miss Agnes H. Eppes, of the Appomattox Plantations, City Point, Virginia, caused the docks in the JAMES at that town to be thoroughly examined for Cordylophora, but with a negative result. Early in the present month, Richard Eppes, Jr., and myself made another search with the aid of my hand dredge, with the same result. I have never yet found the colonies in water which, like the James in this vicinity, does not support barnacles. I can see but one reason why the water of the James should not support Cordylophora (as well as Balanus), at least as far up the river as the mouth of the Appomattox, viz.: it appears to carry fine sediment in suspension for a comparatively long period after freshets. Judging from what I have seen of the

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estuary of the James, I should expect to find colonies on the older landings in the region of Lower Brandon, Jamestown Island, and Carter's Grove. The waters of the CHICKAHOMINY, which also Mr. Darton and myself traversed from the mouth well toward the head of tide, seem nearly as favorable for the colonies as those of the Pamunkey, and for similar reasons.

I have made a few observations relative to the range of organisms, which are accessible to the colonies as FOOD.

Our Cordylophora appears to be exclusively carnivorous. Its tentacles are by far less sentitive than those of the fresh-water Hydra, and their movements proportionally sluggish. Contact of a comparatively large form is necessary to stimulate them to action. Microscopic animals, and even many visible to the naked eye, swim against their tentacles with impunity. The smallest prey which I have seen the hydroids capture and devour were rotifers about one-third the dimensions of *Philodina roseola*, and a form quite readily visible without a lens.

Both at Cinder Cove and in the Patapsco a small, but extremely active and fierce nematode frequents the stems and branches of the colonies. I have often seen them wriggling along individual stems among the foreign particles, diatoms, etc., commonly adhering to their surface. They do not appear to appreciate in the least the danger of being captured by the voracious hydranths which tip the plant-like stems and branches of the animal forest which they inhabit, and commonly proceed directly into contact with their tentacles. After a desperate struggle (in which the nematode lacerates with its powerful jaws the ectoderm of its captor's tentacles and body-wall, but without avail) the worm is usually forced alive and writhing with pain from the nettle cells with which its body is beset, into the hydroid's enormously enlarged mouth, and finally into its stomach. At Cinder Cove these worms appear to constitute no inconsiderable portion of the hydroid's food. Here I also observed the devouring of an insect larva fully three times the length of a hydranth. The posterior extremity of the larva projected far out of the mouth of its devourer, being securely held in place by her tentacles.

Last summer, at Curtis Bay, I found attached to Nitella, quantities of which the fishermen had gathered from the tide water at that point in which to pack their soft crabs, numerous rotifers apparently the same in every respect as *Philodina roseola* of our cemetery urns, save in the absence of the red color from the digestive organs. I had previously offered the latter to a detached hydranth of Cordylophora, and three of the former were devoured in quick succession. I therefore concluded that in Curtis Creek this tide-water Philodina probably also serves as food for the hydroids.

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The most accessible prey of the Patapsco colonies appears to be a small species of Water Flea, which, during the summer months, also abounds among the stems of the colonies. These are readily swallowed, but the dimensions of a larger species of crustacean which they are able to capture, are such that the hydroids are compelled to devour them gradually, as in the case of the above-mentioned insect larva.

At Fort Covington I have at certain seasons seen attached to the stems and branches of the colonies large numbers of tubular cells, constructed by small crustaceans (not unlike the smaller water fleas just mentioned), which also serve as food. Here, too, the beautiful colonies of Vorticella, which grow upon the stems in great profusion during the early summer (p. 220), probably contribute to the food supply.

BALTIMORE, *Nov.* 7, 1892.

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A STUDY OF ABORIGINAL RELICS FROM THE STONE GRAVES OF TENNESSEE.

Amongst the races that formerly peopled the Continent of North America none have left more numerous and interesting traces of their daily life and handiwork than the people known as the STONE GRAVE INDIANS OF TENNESSEE.

This name has been given in later days from their manner of burial, which differed from methods generally employed by other aborigines. The territory showing evidence of the practice of their peculiar customs is a wide one, comprising the area now known as Kentucky and Tennessee, and extending in a less degree into the surrounding States, from Lake Erie to the Savannah River. In the Central Basin of Middle Tennessee and its surrounding highlands are many traces of occupation left by these people. The region possesses very great natural advantages; its climate is temperate and even, it has a rich limestone soil, and is abundantly watered. It is, then, no matter of surprise to find it was once the scene of a dense and busy population, the valleys of the Cumberland River and its tributaries appearing to have been the section most closely settled. Here are to be found unmistakable evidences of long and peaceful occupation, for in no other way can be explained the advance toward semi-civilization made by these aborigines, and testified for them by their work left in pottery, shellwork, careful method of interment, mounds and fortifications.

So numerous are the last mentioned, that (quoting from Dr. Joseph Jones) "it is evident that a chain of fortified towns extended in former times all along the valley of the Big Harpeth."* The necessity of defense probably developing in a late period of their occupation, when pressed by the inroads of fiercer and stronger people.

* "Explorations of the Aboriginal Remains of Tennessee."

[JULY 25, 1895.]

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The site of the City of Nashville, and a surrounding radius of ten miles, may be taken as a typical section of the country once occupied by these aborigines. In this locality are the extensive cemeteries over parts of which the City of Nashville has been built; these sometimes occupy acres, and, though oftenest lying a foot or two below the surface, can be occasionally recognized by the low edges of the flat stones employed in their construction obtruding above the ground. I know of one field where some years ago were counted seventeen hundred of these primitive but carefully prepared sepulchers. In all cases these were alike in general features, the earth was excavated about two feet and the opening lined with smooth flat stones, the head and foot stones generally single pieces. In this chamber the body was laid full length, natural position, contrary to the general Indian custom of interment, in a crouching one. On the stones around it were then placed heavy slabs, in some instances a single slab seven and eight feet long has been used as a cover. The stone cists are placed close together, often touching, the side wall of stone serving for two cists. As a rule separate burial was practiced, but occasionally two skeletons, and sometimes four, are found in one cist. The rock used is a slaty fossiliferous limestone, easily detached in large layers, and may be identified as the Trenton. The cists were not always spread out into burying sites, but were frequently placed in tiers, one above the other, forming small mounds. Instances are cited of mounds almost entirely composed of cists and constructed so perfectly that the lids of the upper row of cists presented a rounded rock surface. Many skeletons and crania have been removed from the cists for scientific investigation, the bones of adults showing a race up to the usual standard of height. The crania from both mounds and cemeteries present the same features, show great irregularity of form and occipital pressure, the back part of the skulls being flattened and the walls abnormally high. Measurements made by Dr. Joseph Jones and Dr. Morton show large internal capacity for

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this class of crania. Close resemblance in characteristics are found between these skulls and those of the Toltec stock, the same irregularity of form, the parietal walls not corresponding, and the general shape quadrangular. These peculiarities they possess in common with the Inca Peruvians and ancient Mexicans, totally differing, it will be remembered, from the ancient Peruvians. Both Dr. Jones, in work referred to, and Dr. Morton in "Crania Americana," agree in acknowledging the resemblance.

Many relics of personal adornment have been recovered from the cists of both mounds and burying sites. Amongst them the carved sea shells are perhaps the most finely finished, they show taste and skill as well as great variety of design—the incised lines are made with precision and bear relation to the general design—the work upon these gorgets is, of course, often rude, but never haphazard.

In addition to designs which are probably symbolic, are some representing birds, serpents, spiders, and the human countenance, a few human figures, and many of the swastika. Much of this class of work has been described with care and great interest by W. H. Holmes in "Art in Shell of the Ancient Americans," published in Reports of Ethnological Bureau of the United States.

The constant repetition of the swastika in the incised and open work is well worth the study given by Prof. Wilson of the Smithsonian, through whose kindness I was shown the most finely finished gorget I have ever seen. It was taken from a stone grave in a Tennessee mound and represents a seated figure with feet upon the same level, turned in. The first glance at this singular piece of incised drawing, made with steady hand and definite purpose to its accomplishment, recalls the representations of Buddha found in such numbers in bas-reliefs and statues in the rock-cut temples of India. Associated with the figure (cut upon the shell as with the stone images) is the profuse use of the swastika.

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The shell of which the gorgets are made is the *Busycon perversum*, the central spine of the same shell is often found in the cists, smoothed into large pins for use and ornament.

The great number of objects made from this sea shell obviously points to long-continued trade with seaboard tribes, as do the small sea shells which were pierced and used as beads. Very few trader's beads are found in this section (and they only with remains of later Indians), but quantities of native manufacture—almost anything that could be put on a string—appears to have been used for the purpose; many were made of bones long and short, slender and thick, contrasting in workmanship with the polished bead produced, by patient working, from the valve of the unio or river mussel. The unio lending its natural shape for spoons, knives, scrapers, etc.

Examinations of the Stone Grave localities have brought to light many objects formed of clay and hardened by fire; a great deal of this pottery is uninjured by its long exposure to damp, the stone sides and top of the cist preserving it from the pressure which has frequently destroyed the pottery of the Columbian Indians when buried with them.

In the pottery of the Stone Grave Indians artistic thought is largely an element in its construction, as shown in shapes of vessels and their ornamentation; the symmetry and grace of some specimens are remarkable and imitation of animal forms well carried out. The first promptings of art in copying natural forms would not have been apt to develop in a time of savage warfare; hence it is reasonable to suppose that such vessels were placed in the cists before the continued conflict recorded throughout the period of our historic knowledge of this region. The following specimens described in this paper may be considered a typical find in pottery for the student of these burial sites; they were exhumed about a year ago from cists in a garden at South Nashville. The specimens of the rock of which the cists were composed may be identified as the Trenton limestone by the fossils it contains, this being the rock generally used for the purpose. The ground all around had been exam-

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ined, and objects of interest removed, before the cists containing the relics now before you had been opened. The surface was thus thickly strewn with fragments of cist rock, and paleolithic and neolithic implements, broken and whole; some from the cists previously opened, and others surface specimens of later Indian occupation. Amongst objects taken from the cists were large pieces of massive slabs; they are formed of a conglomerate of clay and broken shells. The shells, which form the binding ingredient, are in recognizable pieces, and many minute whole shells are in the mixture as if scooped up roughly from a deposit to throw into clay for mixing. The conglomerate is in nowise different from that prepared for the finer pottery, except in the coarser texture, the ingredients and mode of treatment by sun-heat and fire apparently being the same. It is the coarsest mixture I have yet seen of what may be called aboriginal pottery. It is possible the pieces are fragments of altars, but nothing in the surroundings pointed either to sacrifice or partial cremation. It seems most probable that in these massive fragments we find an attempt to use prepared or artificial material for the large cists where burial was made in the natural position, as the funerary urns of the finer, close-grained pottery have been used by many peoples in various periods of their development for the reception of bodies prepared for the smaller receptacle by cut tendons or entire or partial cremation. Such pieces of shell conglomerate or pottery have not been figured before (to my knowledge), and if the supposition is correct that they form parts of cists, we see a new feature of the work of the Stone Grave Indians. Some very finely finished paleoliths are found in the cists, especially when taken from the small mounds, where several rows of the cists were placed one above the other. From the cists of the garden came some arrowheads and spearheads of various sizes, some with notches for tying, and others with rounded ends for insertion in wooden handles. Some show the difference of angle in sides, which it has been thought imparted the rotary motion in flight to the weapon. The implements are in no way different from those of ordinary Indian manufacture.

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The beads are all home made, there are no trader's beads amongst them, nor am I aware of any trader's beads having been taken from the cists of the large burial sites. This clearly points to their antedating the visits of the white voyagers. Three or four of the beads of this find are encrinites, taken from the limestone in which they are so plentiful, and twelve are made of the pottery. These are depressed in the center, like two little round balls had been stuck together; several are evenly pierced lengthwise, with a tiny hole for stringing, while the rest have not been pierced, but could have been used as pendants by a string tied around the depression. The clay is fine and close; the shell, if any was used, was pulverized so thoroughly that only very minute specks of what may be shell occasionally appear on the surface. The burning of the beads was much more thoroughly carried out than with other objects shown. Two implements made of pottery and rarely found are in this collection; in shape they are like large mushrooms, and the component parts of the mixture rather coarsely broken, though nothing like as much so as that of which the slabs are made. The polished surface of disk and handle indicate their use as rubbers, probably in dressing skins, the depression on the top of the handle relieving the thumb in their use. Such implements for such purposes show a great advance beyond the water-worn cobble used by the Columbian Indian for similar work. The vessels of this find vary greatly in size, from a tiny paint saucer to the largest light colored one, which would hold a quart. One with tiny spouts pinched in the soft clay by the maker suggests his intention of its being a drinking cup. A small vessel, not unlike in shape to an ordinary iron pot, was intended for use over a fire; that it had been so used might be inferred from its brittleness, being broken in small pieces when recovered; the pieces showing lines of fracture that fitted, it was possible to put it together in original shape. The double handles allowed sticks to be thrust through to hold it over the embers; or hung by strings, either sticks or strings being daubed with clay to prevent their burning. Holding but a

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small quantity, it was probably used for glue or medicinal drink. Two other bowls found in these cists had been probably used as food vessels; one a low round dish of very fine compact material, two inches high and six in diameter, the other of coarser grain and square in shape, with sloping sides and smaller at bottom than top. No pottery or fragments of pottery like these are found amongst the relics left by the Columbian Indian of this section, though many broken pieces of his making can be collected from the surface of the ground, and where freshets have caused the rivers to cut new channels in the alluvial bottom lands.

As we have seen, the pottery is of varying grades of fineness of make; in the more carefully prepared material used for the ornamented dishes the clay and pounded shell are so thoroughly mixed and form so tenacious and close a substance that after molding it admitted of carving. This was done with a sharp implement of flint or shell, the marks of which are clearly visible, particularly on the human heads, which are placed on the edge of some of the bowls. The baking of the pottery was very variable, owing, no doubt, to the imperfect mode of treatment; in some cases the clay is unchanged in color and quite dark, in others it has become yellow, or even red in places; there are no indications of either paint or glaze on any of the objects in this collection. In the opinion of an experienced potter, all these objects are made in the same way of the same ingredients, more or less carefully mixed, and have all been subjected to action of fire. The difference in color is entirely owing to accidental effects of the heat, gas and the smoke of the fires.

The appearance of greasy polish, which is common to a great deal of the pottery, is likely the result of the clay absorbing the soot of the fires made of the pine fuel and from handling. Two of the vessels here are alike in general design, but differ in size, finish of workmanship, color, age, and use. Placing the face of these two vessels against a flat surface and tracing the outline, the common thought in molding both is revealed. The

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design of the maker is clearly seen to have been a sunfish, such as is found in most of our streams (Figs. 1, 2). In the smaller bowl

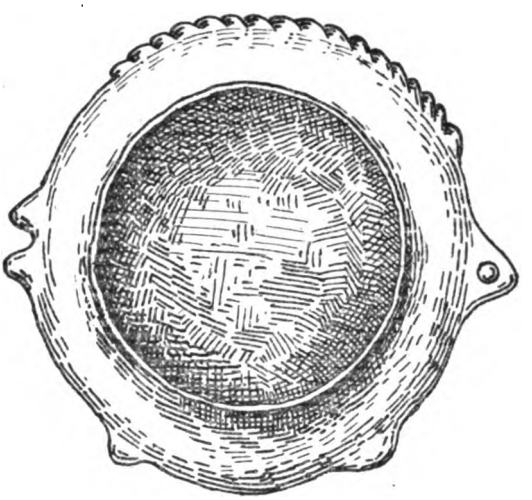

FIG. 1.

THE SUNFISH BOWL (YELLOW CLAY).

Top View, looking into bowl, and showing outline of fish, from tracing made by inverting bowl.

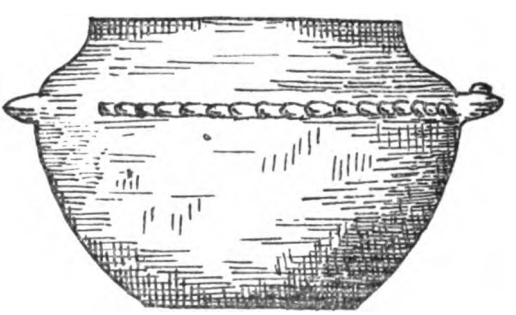

FIG. 2.

Side View, showing dorsal fin and eye in relief on handle. Scale ½ full size.

the imitation of the fish is more perfectly carried out, as may be seen by comparing it with illustrations of the same in any work of natural history.

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The bowl is much darkened and worn, but where it has been rubbed the color shows as bright as in the larger bowl of same shape; the eye of the fish is in relief, and the jawbone has been indicated, as has the dorsal fin, by scraping or cutting; the forked tail of the fish is well copied.

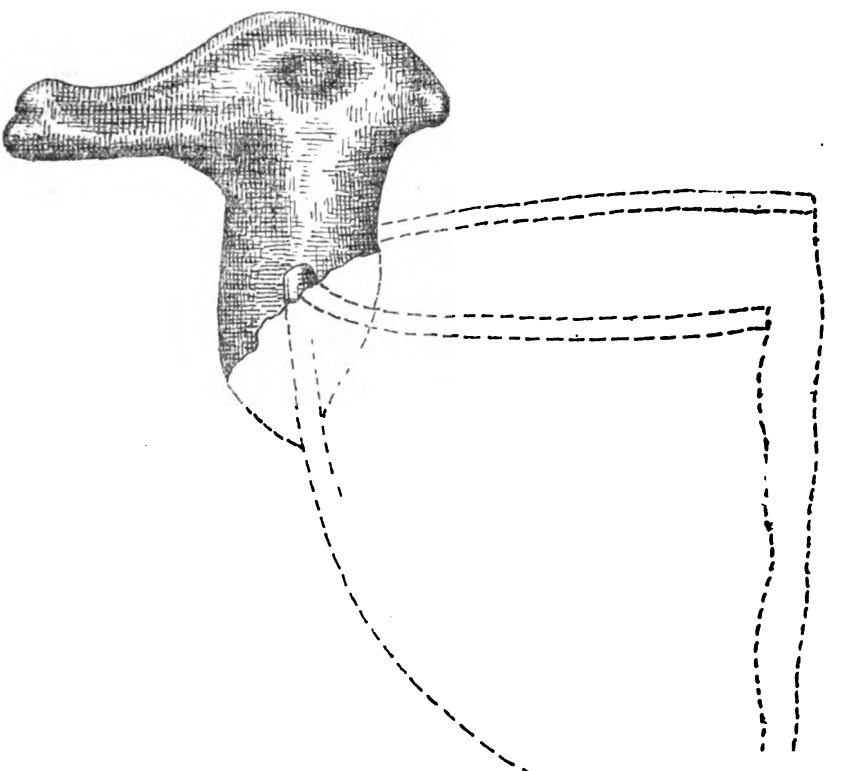

FIG. 3.

Duck head, broken from bowl. Color, brick red. Scale, full size.

These vessels were probably placed in the cist at the time of the interment, filled with food, as was the custom amongst many primitive people; the larger vessel may then have been used for the first time, as it is totally devoid of traces of use. The duck (Fig. 3) furnished another model for these aboriginal designers; the drake's head was perfectly imitated, the little knob

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upon the bill, and the short little curl at the back of the head is closely copied; the specimen here is red in color, and a very soft frail pottery, yet the double mandible is shown, and the skull bone is seen in the shape of the head. The birds' heads in these bowls are always in natural position, looking forward, the bowl forming the body of the bird, and the tail indicated by lug (for holding the vessel), on the opposite side of the rim. Vessels fashioned as these were so ill adapted for handling that it is reasonable to refer them to ceremonial use, or for holding the food placed with the dead at the time of interment.

To the latter purpose we may ascribe the bowls with human heads attached, of which there is one specimen amongst this find, as well as several of the heads, which once formed parts of similar objects.

One of these heads was the outside of a handle, and was used a little differently on the vessel to which it was attached, than the others, which stood upon the rim in a manner illustrated by the entire bowl. This head handle is a different type of head from the others, the whole face is very broad and surmounted by a singular head-dress with three projections, the middle one larger than the others, the nose has been broken but shows to have been flat and broad, the marks of the cutting implement show plainly about the eyes. The smallest of the heads is much worn, it has deep indentations for eyes, and mouth, which may have been made for inserting bone or shell. Another head is a queer mixture of the toucan head and human countenance, the forehead slopes back into a high conical ridge, which runs down the back of the head to the neck, dividing it into two parts; the outline of the ear on one side is quite perfect, though very large. Two more of the heads remain to be described; both are well finished, every feature showing cutting after the modeling, one has holes at eyes and mouth for inlaid shell, and the other has closed lids. They are remarkably spirited in execution for such crude work and are suggestive of attempts at portraiture.

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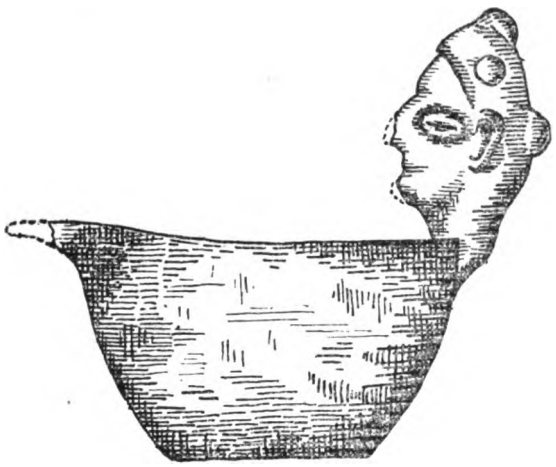

FIG. 4.

HUMAN HEADED BOWL (DARK BROWN).

Side View, showing broken handle and human head in profile.

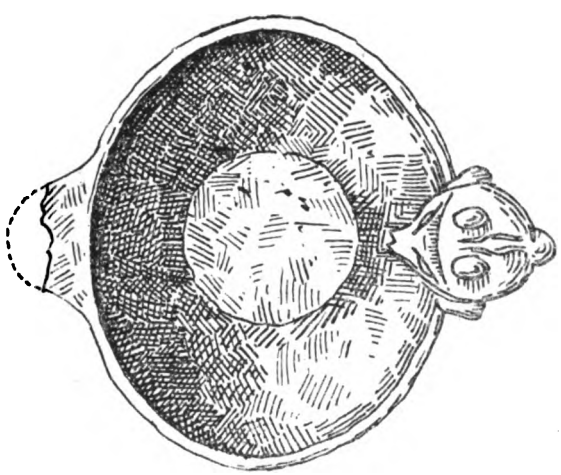

FIG. 5.

Top View, looking into bowl, showing oval shape; also top of human head. Scale, ½ full size.

The bowl (Figs. 4, 5) with the head attached is a deep oval vessel, holding over a pint. On the opposite side of the rim from the

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head is a lug or handle. In these human headed bowls the faces look into the vessels, unlike the animal heads which look away from it. The forehead in the head on this bowl is well shaped, the head-dress is slightly raised where it rests on the forehead, and runs up into the center point; on each side are the little knobs, and a decided one projecting at the back. The eyes are closed, both lids shown, and are long, full, and prominent. There is something almost of classic suggestiveness in this head, but the flattened occiput, and high sides show the maker's attempt to copy in this, as well as in others here, the artificial form of the heads he saw daily around him. As the work of people for whom it is only claimed that the first glimmer of the dawn of art were leading, the three last heads are excellent efforts at moulding and cutting. It is impossible to look at them without speculation at once intruding itself, upon the origin and development of the people, who certainly had long past the line between savagery and barbarism, which Lewis Morgan draws at the making of pottery.

LETITIA HUMPHREYS WRENSHALL.

BALTIMORE, *May*, 15, 1895.

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A LIST OF THE BIRDS OF MARYLAND.

By F. C. KIRKWOOD.

The following list of the Birds of Maryland is the result of a promise made to the late Prof. Geo. L. Smith shortly before his untimely death. It includes all our regular birds and is specially intended to give the time of their arrival and departure and also their nesting periods. It also includes such stragglers as I have been able to find record of, and such as no doubt occur, but have not been recorded within our limits, our state being very deficient in ornithological lists.

It is compiled from the author's field work from January 1, 1881, to date, combined with which is that of the following gentlemen who kindly gave me the use of their collections and note books, and to whom I now extend thanks:

Wm. H. Fisher, Baltimore City.
Arthur Resler, " "
W. N. Wholey, " "
A. T. Hoen, " "
Geo. H. Gray, " "
P. T. Blogg, " "
J. Hall Pleasants, Jr., Baltimore City.
J. E. Tylor, Easton, Md.
H. W. Stabler, Jr., Sandy Springs, Md.
The late Edgar A. Small, Hagerstown, Md.
Robt. Shriver, Cumberland, Md.

I have also to accord my thanks to others mentioned in the text and to Mr. Robt. Ridgway, of Washington, and especially to Mr. Chas. W. Richmond, of Washington, who has kindly given his time to an ample review of the manuscript and added many important notes, giving items from the District of Columbia and surrounding country.

The large majority of my own observations during the last six years have been made in Dulaney's Valley, Baltimore County, and during the last four years I have spent two weeks

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each spring observing our nesting birds. In 1892 and 1893, on the waters between Chestertown and Eastern Bay; in 1894, on Sinepuxent and Chincoteague Bays, between the Delaware and Virginia lines, and in 1895, at Vale Summit on Dan's Mountain, in Allegany County. Flying visits have been made by myself and others to various other points within the state.

I have omitted the word "shot" in a great many cases, but unless it is expressly stated that the bird was only seen, the specimen has been secured; this of course not applying to such birds as are easily identified on the wing.

In compiling the number of a "set" of eggs, the majority of notes are my own; these include all nests with a completed complement of eggs, whether collected or not, and also such nests as held young birds from which none had flown. In some of our commoner species the number is quite large, and shows the variation in a "set" much better than the usual "four or five, sometimes three or six."

I have omitted mention of "second nestings;" a good many of our birds nest twice and some three times; but except in one or two cases I could not identify the same pair of birds, and as nests in all stages, from "started to build" to "birds ready to fly," can be found any day in the height of the season for most of our commoner species, I only give extreme nesting dates, preferring such as record eggs where possible.

A list of the works and publications to which I have made reference is appended. The nomenclature followed, as also the number given, is that of the American Ornithologists Union.

The index kindly prepared by Mr. W. H. Fisher includes all our local names, each bird being referred to under its A. O. U. number.

* * * * * *

Maryland is situated between the parallels of 37° 53′ and 39° 44′ northern latitude and the meridians of 75° 04′ and 79° 33′ western longitude. Mason and Dixon's line separates it from

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Pennsylvania and Delaware, and it is separated from Virginia by a line drawn from the Atlantic Ocean to the western bank of the Potomac River and low water line on the Virginia shore, this being the southern border of Maryland from the source down. From the source of the Potomac a line runs north to Mason and Dixon's line. The gross area of the state is 12,210 square miles: 9680 land; 1203, the Maryland part of the Chesapeake; 93, Assateague Bay; and 1054, smaller estuaries and rivers.

The three leading topographical regions of the eastern portion of the United States, *viz.*, the Coastal Plain, the Piedmont Plateau, and the Apalachian region are all typically represented within the limits of the state. The Coastal Plain, or tide-water Maryland, forms the eastern portion, lying south of a line drawn from Wilmington to Washington, through Baltimore. This is closely outlined by the track of the Pennsylvania Railroad; it covers about 5000 square miles. The Eastern Shore, except in the extreme north, does not reach at any point 100 feet in elevation, while most of it is below 25 feet. It is deeply cut up by tide-water rivers and bays. This also describes the tract known as the "Necks" between Baltimore and Havre de Grace. The temperature is much modified by the surrounding water, the southern portion having a mean annual temperature of 58°; but the greater part lies between 56° and 54°; the northern part averaging 52°. Southern Maryland or the Western Shore is different, considerable of it reaches 100 feet, and in places as much as 180 feet. The mean annual temperature seldom exceeds that of Baltimore, which is 55.6°, by more than 2°.

The Piedmont Plateau, or Central Maryland, extends from the Coastal Plain to the Catoctin Mountain, and has an area of about 2500 square miles; it is broken by low, undulating hills, which gradually increase in elevation to the westward. Along the eastern margin, heights exceeding 400 feet are frequently reached, and at Catonsville 525 feet, while at Parr's Ridge, in Carroll County, it rises above 850 feet. At Frederick City,

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the elevation of the valley is about 250 feet above tide. The mean annual temperature ranges from 50° to 55°.

The Apalachian region, or Western Maryland, consists of a series of parallel mountain ridges with deep valleys between them, cut at nearly right angles by the Potomac River. The Catoctin Ridge reaches 1800 feet, and the Blue Ridge, at Quirauk, 2400; while at Middletown and Hagerstown the elevation is 500. The mountains proper begin at North Mountain, and reach in a number of cases 3000 feet and over; while the valleys near the Potomac have an elevation of 500 feet rapidly ascending; the river at Cumberland being about 600 feet. The mean average temperature ranges from 50° to 53°.

In the above mentioned areas, the Coastal Plain and the Piedmont Plateau are ornithologically within what is usually considered as the Carolina faunal area, as shown by the nesting of the Cardinal, Carolina Wren, Tufted Tit, etc. It will be found to be fairly divided into two sub-faunal regions. In the lower, or Coastal Plain, will be found the Mockingbird, Fish Hawk and Fish Crow, breeding in numbers. In the southern part of Maryland will be found traces of a still more southern faunal area, the Louisiana, distinguished by the presence of the Brown-headed Nuthatch.

The eastern part of the Apalachian region is also included in the Carolina faunal area. The Alleghanian fauna covers the mountain region from North Mountain westward, it also appears an the higher parts of the Blue Ridge. This faunal region is the breeding range of the Chestnut-sided Warbler, Rose-breasted Grosbeak, Wilson's Thrush, etc. As this section has never been fully investigated by ornithologists, there remains the possibility, as suggested by Mr. C. W. Richmond, that the Snowbird (*Junco hyemalis*) may yet be found breeding in some of the hemlock tracts still standing; this would give a tinge of a more northern faunal area, the Canadian.

A circle drawn round Baltimore City, with its centre at Baltimore and Charles streets, and a 15-mile radius, will take in over one-half of Baltimore County, and parts of Anne

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Arundel and Howard Counties, a small portion of the Chesapeake Bay, and Patapsco, Back, Middle and Gunpowder Rivers. In this circle a great diversity of country is found. The part of Anne Arundel included is nearly level and low lying, as is also the "Necks" of Baltimore County. On these necks and also along as far as Havre-de-Grace, are located the famous ducking clubs of the Chesapeake. The water is brackish, or salty, rising and falling with the tide. The timber is principally short leafed pine. The other part of Baltimore and Howard Counties is more or less hilly, rising in places to over 700 feet. The water courses are swift running streams in more or less deep cuts, some even in rocky gorges. These steep banks and most of the uneven land is heavily wooded with oaks, chestnut, beech, etc. (pines only appearing in small isolated patches), while the level ground is under a high state of cultivation. All observations to which a locality is not given are within this circle; in special cases within this circle, and in all outside it, the exact location is given.

The section usually worked by Messrs. A. T. Hoen, W. N. Wholey, and myself, extends from Waverly, in the northern part of Baltimore City, to Towson, and so through Dulaney's Valley, across the lower half of Long Green Valley to the Harford pike and back to Baltimore; Mr. J. Hall Pleasants working within it around Towson.

Waverly has an elevation of 200 feet and Towson 500. The lowest point in Dulaney's Valley is the level of Loch Raven, 170 feet. The ridge between Dulaney's and Long Green Valleys reaches 560 feet. Long Green Valley is all above 250 feet. The Gunpowder River crosses this area in a zigzag course, at nearly right angles, its banks, except in Dulaney's Valley, being precipitous. Four miles of it constitutes Loch Raven.

Mr. Wm. H. Fisher's usual basis of observation is from Mount Washington to Lutherville, including Lake Roland on Jones Falls (230 feet above tide), and the Green Spring Valley, which, starting at 260 feet, near Sherwood, gradually ascends as

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it goes westward. The country north and south of this valley is very uneven and high (560 feet in some places).

Messrs. G. H. Gray and P. T. Blogg, working to the west of the city, have quite a different country, most of their observations being made in the rocky, heavily timbered gorge of Gwynn's Falls, between Calverton and Powhattan. The bed of the falls at Calverton has an elevation of 80 feet, and at Powhatan dam of 320 feet, the country on both sides ranging from 300 to 500 feet.

Mr. A. Resler takes another field, collecting a good deal on Patapsco marsh, just south of the city, also "down the necks," and near Botterill Post-Office, in Howard County, 14 miles from Baltimore.

Order PYGOPODES—Diving Birds.

Family Podicipidæ—Grebes.

Colymbus holbœllii (2). Holbœll's Grebe.

"Not uncommon on the Potomac in winter" (A. C., 110), this species has been taken in Lancaster County, Pa., and at other points in Pennsylvania and New Jersey (Birds E. Pa. and N. J., 38), so I presume it occurs all over tide water Maryland. On February 25, 1894, I watched one for about an hour at Lake Roland where it was swimming around in a hole in the ice, which otherwise covered the lake. Later, when we threw stones at it, it would neither fly nor dive, so we left it.

Colymbus auritus (3). Horned Grebe.

Fairly common in tide-water Maryland during migrations, a number winter with us. Noted from October 7 ('76, Resler) at Back River, to April 23 ('90, Resler), at the same place. April 25, at Washington, D. C. (Richmond). Inland, a young male, shot at New Market, Carroll County, by Dr. H. H. Hopkins, was presented in the flesh on February 21, '81, to the Maryland Academy of Sciences. A pair, male and female, were taken at Hagerstown on April 16, '83 (Small), and Mr. Robert Shriver has secured specimens at Cumberland.

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Podilymbus podiceps (6). Pied-billed Grebe.

Common from September 1 ('93) to March 31 ('88, Resler), a few stay with us to breed, but, as far as I know, the nest has not been found in Maryland. Specimens have been taken on April 28 ('93) and July 31 ('75, Resler), at Back River. At Hagerstown, in June ('80, Small), and near Westminster, early in September ('80, Fisher) nine, possibly a family, were taken in one day from a mill pond. At Washington, common from August 25 to May (Richmond).

Family URINATORIDÆ—Loons.

Urinator imber (7). Loon.

Fairly common during winter on ocean front, Chesapeake Bay, and larger waters of Maryland. In New Jersey it is given as arriving October 3 (Birds E. Pa. and N. J., 39), but I have only spring dates ranging from March 9 ('91, Fisher), at Legoe's Point, to June 17 ('93, J. F. Hargreaves), when a very noisy pair were on the Gunpowder River, near the Pennsylvania Railroad bridge. Mr. W. S. Walker, of Chestertown, writes me that it is "one of the last birds to leave Chester River." At Washington, from September to April 25 (Richmond). Audubon says (vii, 284): "the Loon breeds in various parts of the United States from Maryland to Maine. I have ascertained that it nestles in the former of these states on the Susquehanna River." Not known to nest here now.

Urinator lumme (11). Red-throated Loon.

Occasionally taken on our waters during winter. On February 16, 1878, the late A. Wolle presented the Maryland Academy of Sciences with shells taken from the stomach of one of these birds, presumably captured near Baltimore.

"Not uncommon on the (Potomac) River during the winter months" (A. C., 110). "In the spring of 1882 one was caught in a gill net in the Potomac River, a few miles below Washington, and is now in the possession of Mr. O. N. Bryan, of Marshall

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Hall, Md." (H. M. Smith and W. Palmer, Auk, v, 147). One shot on Chester River was sent to the Smithsonian for idendification by Hiram Brown, Pomona, Md. (Smith. Report, 1885, 192), "and I also learn from Dr. A. K. Fisher of another, captured on the Potomac, near Fort Washington, October 20, 1889" (Birds Vas., 41).

Family ALCIDÆ—Auks, Murres, and Puffins.

Cepphus grylle (27). Black Guillemot.

South in winter to New Jersey (Manual, 16). Audubon says (vii, 273), "during severe winters, I have seen the Black Guillemot playing over the water as far south as the shores of Maryland. Such excursions, however, are of rare occurence."

Alca torda (32). Razor-billed Auk.

"Winter visitant on the New Jersey coast; one specimen was secured by Dr. W. L. Abbott as far south as Cape May" (Birds E. Pa. and N. J., 41). "Capt. Chas. H. Crumb informs me that three have been taken near Cobb's Island, two in 1884 and one in 1887, one of which is now in my possession" (Birds Vas., 4), and several more were taken during the winter of 1892–93 (Capt. Crumb in letter to Wm. H. Fisher).

Alle alle (34). Dovekie.

"Regular winter visitant along the New Jersey coast, varying in abundance from year to year" (Birds E. Pa. and N. J., 41). On December 9, 1877, one was caught alive on the sea beach near Ocean City, Md., and sent to the Maryland Academy of Sciences by Mr. Robert Henry, of Berlin, Md. Capt. Crumb has taken two at Cobb's Island.

Order LONGIPENNES—LONG-WINGED SWIMMERS.

Family STERCORARIIDÆ—Jaegers and Skuas.

Stercorarius pomarinus (36). Pomarine Jaeger.

Winters on the Atlantic coast from Long Island southward.

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Stercorarius parasiticus (37). **Parasitic Jaeger.**

Winters along the Atlantic coast from the middle states southward.

Stercorarius longicaudus (38). **Long-tailed Jaeger.**

Migrates south along the Atlantic coast to the Gulf of Mexico and West Indies.

No doubt all three of the Jaegers occur off our coast, but we have no record of them.

Family LARIDÆ—Gulls and Terns.

Rissa tridactyla (40). **Kittiwake.**

"Very rare winter visitant on the New Jersey coast" (Birds E. Pa. and N. J., 42). "About ten years ago the late Henry B. Graves, of Berk's County, mounted a young Kittiwake which had been captured near Lancaster City, in midwinter," and "Dr. A. C. Treichler, of Elizabethtown, mentions the species as a straggler in Lancaster County, Pa." (Birds Pa., 17). "Captain Crumb reports this species as a rare and irregular winter visitant at Cobb's Island, but he has never taken a specimen" (Birds Vas., 41).

Larus leucopterus (43). **Iceland Gull (?).**

On November 23, 1893, I saw a pure white gull in the inner harbor of Baltimore City. It came within fifty feet of me at times, as I watched it for fully half an hour. In reply to a description of this bird, which I sent to Mr. Robert Ridgway, he writes: "The gull which you think may be the young of *L. leucopterus*, is undoubtedly what American ornithologists here consider and describe as the young of that species. There is a question, however, whether it is not in reality the young of *L. kumlieni*. There are no present means of settling the question, there being no specimens of undoubted young of *L. leucopterus* in any American collection so far as I know."

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Larus marinus (47). Great Black-backed Gull.

"Rare winter visitant along the New Jersey coast, a few, however, probably occur every year" (Birds E. Pa. and N. J., 43). "Has been taken (including the adult) at Cobb's Island, where on the authority of Capt. Crumb it is not common, though seen every winter" (Birds Vas., 41); "south coastwise in winter to Florida" (Key, p. 743). On January 27, 1895, at Holly Point, I saw one of these birds circling over the mouth of Gunpowder River, but it kept considerably out of range.

Larus argentatus smithsonianus (51*a*). American Herring Gull.

In Baltimore harbor this species is a common winter resident, common over the Basin at Light and Pratt streets, where they live on the refuse. During the latter part of September I could not find any, but quite a number were at hand on October 5, ('94). On May 1, ('95), a number were observed, and on May 6, ('95), two were in Canton Hollow. They also occur on all our waters, but not in numbers as they appear in our harbor. "Common in winter at Washington" (Richmond).

Larus delawarensis (54). Ring-billed Gull.

At Washington "seen over the river during the winter months, more frequently than the Herring Gull" (A. C., 108). "Winters abundantly on the coast of the Middle States, I saw it continually during two winters over the harbor of Baltimore where it flies among the shipping, with Bonaparte's Gulls and several kinds of terns" (Birds N. W., 638).

However the above may have been when Dr. Coues was at Fort McHenry, I have been unable to substantiate the statement, a stray tern being of very unusual occurrence above the Fort, while Bonaparte's Gull, as a rule, keeps below it. My only spring notes are of two near Holly Point over Gunpowder River on March 25 ('94), and a few in the lower harbor on March

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29 ('95), but in fall they are noted near Fort McHenry from September 26 ('94) to November 6 ('94).

Mr. Ridgway writes me: "As to *Larus delawarensis* wintering near Baltimore, it may occasionally do so, but not in any considerable numbers. Here, on the Potomac, it is not considered a winter resident, though it migrates northward very early in spring," and Mr. C. W. Richmond writes: "Not a winter visitant at Washington, it was common during March until the 30th, 1890. Noted from February to April 5, and again in October and November."

Larus atricilla (58). Laughing Gull.

Common migrant from April 28 ('94, Wholey) to May 22 ('95), and from September 29 ('94) to October 12 ('94). A few may spend the summer with us, two pairs being noted at Patapsco Marsh on July 3 ('93, Blogg).

"One of the most abundant gulls at Cobb's Island, where numbers commence to breed about the 20th of June" (Birds Vas., 41). I have been told they breed at Chincoteague Island, and from the fact that I saw a few flying north in the morning and south in the evening over Chincoteague Bay, in Maryland, I presume they do, though a search of ten days (June 5 to 14, '94) failed to locate a breeding site on the ocean front of Maryland, and I also failed during two seasons ('92 and '93) to locate a breeding site on the Chesapeake, though frequently told of them by the fishermen, and frequently seeing paired birds.

Larus philadelphia (60). Bonaparte's Gull.

A tolerably common migrant, noted from March 24 ('94, Fisher) to May 17 ('93), and from October 5 ('94) to November 9 ('92, Resler); a few may also winter with us (Birds N.W., 638). While this species may come up the harbor with the Herring Gulls, I do not think it ever comes beyond the broad water at Broadway Ferry. At Washington they are given as "comparatively common in August and September" (A. C., 108).

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Gelochelidon nilotica (63). Gull-billed Tern.

"Rare visitant along the New Jersey coast, where it is reported to have bred formerly ('As late as 1886, according to Mr. H. G. Parker' [O. and O., 1886, p. 138])." (Birds E. Pa. and N. J., 44.)

On May 19, 20, 21, 1892, Mr. W. H. Fisher noted this species at Cobb's Island, Va., where, Mr. H. B. Bailey says, "a few pairs were seen, but they had not commenced to breed during my visit, May 25 to 29, 1875. They nest here sparingly, however, as I had a set of their eggs sent me which were laid the last of June" (Auk, i, 24–28), and, May 14 to 28, 1894, they "seem to be rapidly diminishing in numbers, being far less numerous than I observed them on two previous trips in 1891 and 1892, when I was collecting in vicinity of Smith's Island, Va." (E. J. Brown, Auk, xi, 259). Casual at Washington (Richmond).

Sterna tschegrava (64). Caspian Tern.

Rare migrant along the Atlantic coast.

On July 4, 1880, Mr. Robert Ridgway found two nests with two eggs in each, they were at opposite ends of Cobb's Island, and about ten miles apart (B. N. O. C., v, 221–22–23). "Capt. Crumb has found three sets of eggs in July" (Birds Vas., p. 42).

"Hon. J. J. Libhart, in his ornithological report, published in the history of Lancaster County, records the capture of two of these birds on the Susquehanna at Marietta, Pa., on September 21, 1847" (Birds Pa., 19).

Sterna maxima (65). Royal Tern.

"They have always been found breeding on a small sand bar off Cobb's Island, but it was washed away during the winter of 1874–75, and although the birds were flying about (May 25–29, '75), they had not chosen any spot on which to breed; but they undoubtedly did so later" (H. B. Bailey, Auk, i, 24–28).

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On July 4, 1880, Mr. Robert Ridgway saw an immense colony there (B. N. O. C., v, 221–22–23), and "Captain Crumb has found eggs in the latter part of June" (Birds Vas., 42). "Rare straggler on the New Jersey coast during summer" (Birds E. Pa. and N. J., 45).

Sterna forsteri (69). Forster's Tern.

"It is the commonest tern in winter and during the migrations in the harbor of Baltimore" (Birds N. W., 679). On March 4, 1893, during a severe snow storm, I saw several terns flying over the channel off Sparrow's Point, which I believe were of this species, but they did not come close enough to be positively identified.

They have been taken near Washington, D. C., and have been found quite abundant over the lower Potomac by Mr. P. L. Jouy (Field and Forrest, vii, 29).

On the evening of June 5, 1894, at North Beach, about ten miles south of Ocean City, Md., I saw some boys who had gathered about 200 "Striker" eggs, and were proceeding to cook same for their supper; they had also shot a number of birds which, on examination, I found to be all Forster's Terns. Next day, June 6, 1894, I visited a marshy island with probably 2000 terns over it, and as far as I could observe all were *forsteri*. Here I noted 12 nests with 3 eggs, 19 with 2 and 41 with 1; how many without eggs I am unable to say.

On June 7 I visited two other much smaller "tumps" about three miles distant; about 200 birds here, on one there were 7 nests with 1 egg each, and on the other 7 with 1, and 1 with 2; this was evidently where the boys had been, as innumerable nests were empty. On June 10 I again visited all three of these "tumps" and on the larger one noted 7 nests with 3 eggs, 7 with 2, and 19 with 1, the number of unoccupied nests being greater than before. On the smaller "tumps" I saw respectively 1 of 2, and 6 of 1; and 3 of 2 and 4 of 1; and more unoccupied nests. Here the birds were much fewer than before, while at the largest "tump" there appeared to be more than

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on the 6th. These nesting places had been visited by other parties between my visits.

Sterna hirundo (70). Common Tern.

"In North America chiefly confined to the Eastern Provinces, breeding variously throughout its range" (A. O. U.). Apparently migratory, three specimens were taken on May 6 ('76, Resler) out of a number seen at Patapsco marsh; and on May 17 ('93), one was shot at the same place. On September 1 ('93, A. Wolle), four were shot out of about fifteen at Gunpowder marsh, these I examined.

Sometimes common, but an irregular migrant at Washington (Richmond).

Sterna paradisæa (71). Arctic Tern.

Breeding from Massachusettes northward, this species comes south in winter along the Atlantic coast at least as far as Virginia.

Sterna dougalli (72). Roseate Tern.

This southern species, going regularly north in summer to Maine, "doubtless breeds" at Cobb's Island (H. B. Bailey, Auk, i, 24–28), and is a "rare straggler on the New Jersey coast during summer; formerly it is reported to have bred in considerable numbers" (Birds E. P. and N. J., 47).

Sterna antillarum (74). Least Tern.

A summer resident in restricted localities, this species is usually seen during migrations.

On June 13, ('94), I visited a nesting colony at the juncture of Miles River with Eastern Bay, where, on a small island, I found four sets of three; twelve of two, and eight single eggs; how many other nesting hollows it is impossible to say, as they are so slight they show no signs of a nest until an egg is deposited. During the fall of 1893, this species was noted at Lake Roland on August 19 and 20, and September 3 and 4 (Fisher).

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Sterna fuliginosa (75). Sooty Tern.

North to the Carolinas and casually to New England; "there is a specimen from Baltimore in the National Museum at Washington, obtained from the late Mr. A. Wolle (Robert Ridgway).

"Dr. A. C. Treichler mentions it as a straggler in the neighborhood of Elizabethtown, Lancaster Co., Pa." (Birds Pa., 23).

Hydrochelidon nigra surinamensis (77). Black Tern.

While this species is locally common over the whole of North America, I can find but few records for the vicinity of Maryland. At Washington, it is given as "less numerous than the Least Tern, found at same seasons" (A. C., 109) "Not uncommon in the early fall at Cobb's Island, Va. It has been seen there in the breeding seasou, but is not known to breed" (Birds Vas., 43). "Transient, occurring on the New Jersey coast, but much less abundantly than formerly. Mr. Scott states that it arrived at Long Branch in 1879, about June 11, and soon became common; although it remained all summer, it was not known to breed (B. N. O. C., '79)" (Birds E. Pa. and N. J., 48).

The Smithsonian acknowledged "Skin of short-tailed Tern, from Potomac River, Thos. Marron" (Smith. Rep. 1891, 793).

On May 17, 1893, Alex. Wolle shot one on Patapsco marsh, and on August 25, 1893, Richard Cantter shot another near Upper Marlborough; both of these I examined in the flesh.

Family RYNCHOPIDÆ—Skimmers.

Rynchops nigra (80). Black Skimmer.

This strictly maritime bird of our southern coast goes regularly north to New Jersey, where it is recorded from June 10 until September 25 (Birds E. Pa. and N. J., 48). On June 19, 1880, a specimen was presented to the Maryland Academy of Sciences, presumably taken near Baltimore.

"Individuals were once seen by ourselves on the Potomac,

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some distance below Washington, September 8, 1858" (A. C., 109).

At Cobb's Island, Va., from May 25 to 29, 1875, they were found in flocks of 20 or 30, as they do not breed until the last of June (H. B. Bailey, Auk, i, 28), and just before dusk on May 20, 1891, four were seen there (Fisher).

"Common at Smith's Island, Va., where we got three on May 15, 1894, but they had not begun to breed by the 26th when we left" (C. W. Richmond).

Order TUBINARES—TUBE-NOSED SWIMMERS.

Family PROCELLARIIDÆ—Shearwaters and Petrels.

Puffinus major (89). Greater Shearwater.

"Atlantic coast generally. A rare straggler to the New Jersey coast" (Birds E. Pa. and N. J., 49).

Puffinus audubonii (92). Audubon's Shearwater.

Atlantic coast from New Jersey southward, breeds in the Bermudas and Bahamas (A. O. U.).

Puffinus stricklandi (94). Sooty Shearwater.

North Atlantic, south to the Carolinas, breeding far north. No doubt all three occur off our ocean front, but as there are no observers there, their presence with that of other of our ocean birds has not been recorded.

Oceanodroma leucorhoa (106). Leach's Petrel.

On June 11, 1895, while fishing on Little Gull Bank, about three miles out from Ocean City, a pair of these birds came and circled round our boat for a few minutes. I have also noted them further out, off our Maryland coast, on several occasions during the month of August, when they followed the vessel generally in company with Wilson's Petrel.

Occasionally heavy easterly gales drive them inland; at Washington, D. C., "one of several shot in August, 1842, is

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now in the National Museum, also another taken near the Navy Yard Bridge, on June 5, 1891, by Wm. Bayley. Wm. Palmer has two; one was shot from a bunch of three or four on August 29, 1893, the other was captured alive in a house on Capitol Hill a few days later" (Richmond).

Oceanites oceanicus (109). Wilson's Petrel.

I have been greatly interested in watching these birds as they flew round the vessel, on several sea trips I have made. Under date of August 20, 1884, I find the following: "Cleared the capes last night at 11.30 P. M., and this morning we have the petrels, which stay with us all day, the Maryland shore being in sight. One is partly albino, having a white breast, belly and back, separated from the usual white by a sooty line."

The only inland record I can find is "one taken many years ago and presented to the Smithsonian" (A. C., 110). "This was shot on the Potomac River about 1859" (Richmond).

Order STEGANOPODES—TOTIPALMATE SWIMMERS.

Family SULIDÆ—Gannets.

Sula bassana (117). Gannet

Occasionally taken on the Chesapeake, three specimens so recorded have been presented to the Maryland Academy of Sciences, where two of them are at present, the other, now in the Johns Hopkins University, taken many years ago at Chestertown, was presented by Mr. Colin Stam(sen?) through Mr. J. J. Thomsen. On April 21, 1894, one was taken in Rock Hall Cove and forwarded alive to the Academy by Dr. A. P. Sharp. Mr. John Murdock presented a mounted specimen on June 6, 1892, referring to which he writes me: "The bird I presented to the Maryland Academy of Sciences was killed a short time previously in the lower part of the Chesapeake Bay, near Mobjack Bay; I have never seen them above that point; generally they go in pairs."

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"I found the remains of one on Smith's Island, Va., in May, 1894. It had been dead about a month, possibly more" (Richmond).

Family ANHINGIDÆ—Darters.

Anhinga anhinga (118). Anhinga.

In the old collection of the Maryland Academy of Sciences was a mounted specimen of the Anhinga, which Prof. Uhler says, came from the Pocomoke River, but owing to the vicissitudes through which the Academy has passed, I have been unable to find the record of its acquisition.

Family PHALACROCORACIDÆ—Cormorants.

Phalacrocorax carbo (119). Cormorant.

Audubon says, "it is rarely seen further south than the extreme limits of Maryland, but from Chesapeake Bay eastward it becomes more plentiful" (vii, 418). A specimen may occasionally visit us with the following species, as it goes casually south as far as the Carolinas (A. O. U.).

Phalacrocorax dilophus (120). Double-crested Cormorant.

Regular, but not a common winter visitant near Baltimore. Further down the Chesapeake, and on Chincoteague and Sinepuxent Bays, it is more numerous. Under date of April 13, 1893, Mr. Wm. S. Walker, of Chestertown, writes me: "The only Cormorant I ever had in hand, I killed some five or six years ago at Hail Creek, at the mouth of Chester River. I have since that time seen one or more of the birds sitting on buoys in the bay between here and Baltimore." The specimen mentioned was in the old collection of the Maryland Academy of Sciences.

At Ocean City single birds flew northward on June 8 and 10, '94.

"One was detected in the District of Columbia many years ago" (A. C., 108). Mr. Geo. W. Duvall sent a specimen from Annapolis to the Smithsonian (Smith. Rep., '72, 57).

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Family PELECANIDÆ—Pelicans.

Pelecanus erythrorhynchos (125). American White Pelican.

Rare straggler. "There appear to be three well authenticated instances of the capture of this bird in our vicinity. 1. Near Alexandria, Va., April, 1864, by C. Drexler, and presented to the Smithsonian. 2. Opposite Washington, on the Virginia bank of the Potomac, fall of 1864; shot by John Ferguson, and seen and identified by several persons who have communicated the fact to us. 3. Near Alexandria, Va., October, 1878, killed by John Haxhurst, and seen by a gentleman connected with the National Museum" (H. M. Smith and Wm. Palmer, Auk, v, 147). "A stray Pelican at Oakland, Md., by Sportsman," is recorded (Auk, iv, 345).

Pelecanus fuscus (126). Brown Pelican.

Exclusively maritime, "from Tropical America to the Carolinas" (A. O. U.). Captain Crumb noted them at Cobb's Island, in the fall of 1881 (Birds Vas., 44), and "Turnbull records one specimen shot off Sandy Hook in 1837, in summer" (Birds E. Pa. and N. J., 52). In the old collection of the Academy was a specimen from the lower Potomac (Uhler).

Order ANSERES—LAMELLIROSTRAL SWIMMERS.

Family ANATIDÆ—Ducks, Geese, and Swans.

Merganser americanus (129). American Merganser.

This, the largest of the "fishermen," is a winter resident, from Sept. 29, ('94), to March 29, ('93 Resler); common on our larger waters.

On March 24 ('95) I watched a bunch of eight for quite a while on the Gunpowder Falls; they were diving in the swift running stream, just above the dead water of Loch Raven. Mr. Shriver says, "something of a rarity at Cumberland, but I have seen a number of them years ago; none lately."

"In the ornothological report of the late Judge Libhart, published about twelve or fifteen years ago in the history of Lan-

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caster county, the Goosander, also the Red-breasted and Hooded Mergansers are all mentioned as breeding in Lancaster County." (Birds Pa. 32).

Merganser serrator (130). Red-breasted Merganser.

From the number brought to market, this is the most common "fisherman" shot on the Chesapeake and its tributaries during the gunning season. Possibly it also stays here to breed, as Mr. W. N. Wholey shot a female on July 8, 1892, at Egging Beach Island, near Ocean City. It was in good condition and not crippled in any way, but the breast feathers were so few and so worn that there can be no doubt of its having nested. Two others flushed at the shot but were not secured. Loch Raven (Chas. E. Dukehart).

Lophodytes cucullatus (131). Hooded Merganser.

Common on the arms of the Chesapeake during gunning season; this species is also to be found generally dispersed over the state, even on small waters. Several flocks were seen on the Potomac, about two miles below Knoxville, on November 5 ('93, Fisher). Loch Raven (Dukehart).

It probably breeds, for on June 7 ('94) I noted one at Whittington's Point, near Ocean City, and Dr. Warren says: "I have an adult female, taken June 23, 1890, in Chester Co., Pa., where this Merganser is seldom seen in summer" (Birds Pa., 345).

Anas boschas (132). Mallard.

Common winter resident, from October 7 ('93) to April 14 ('94, Fisher). Mr. W. S. Walker, of Chestertown, says: "the first ducks to arrive here are the 'flat fowl,' that is those feeding on the flats of the Bay shore, they are Black Ducks, Mallards, Graybacks and Sprigtails." A number have been shot on Loch Raven (Dukehart), and on November 4 ('93, Fisher) they were very numerous on the Potomac between Knoxville and Brunswick. Under "County news," on April 13, 1894, the *Sun* paper says: "Gunners in Alleghany county

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are having a fine time, as the streams are covered with Mallards." On April 5, 1895, a pair were shot at Cumberland (Zacharia Laney).

Anas obscura (133). Black Duck.

Common in tidewater Maryland during the gunning season, quite a number remain during summer and breed. Numerous in the vicinity of Baltimore from August 28 ('93, Fisher), to May 6 ('93, Gray). I observed this species in 1894, at Ocean City, as follows: On June 5 a pair; on the 6th a pair; on the 7th 3, 2, 3, 1, 3, and also a pair with small young on Chincateague Bay about two miles from shore, where it was so rough I could not count the young. On the 10th my man at last succeeded in finding a nest, but it only held the two half shells of an egg, one inside the other.

At Loch Raven, on April 7, ('95), I watched 20 birds for some time, they were feeding in shallow water like tame ducks, and while they kept in a close bunch, were mated, each pair distinctly keeping together.

Anas strepera (135). Gadwall.

While a few no doubt winter with us, the species seems to be fairly numerous in November, and again in April; though it is rather difficult to get statistics, our market gunners classing this and the females of three or four other species as "gray ducks," and our amateurs as "trash ducks." On November 22–3, 1894, about 20 were shot at Spry's Island. At Washington, D. C., they are given as common from September to April (Richmond).

From the *Sun* I take the following: "Williamsport, Md. April 9, 1895. Wild ducks are plentiful along the Potomac, above this place. From the old Sharpless warehouse up to Big Pool, flocks of Gray Mallards abound. These, the sportsmen say, are rare, and it is unusual to see so many of them along the river."

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Anas penelope (136). Widgeon.

This Old World species is given as "rare or casual along the Atlantic coast of North America" (Key, 694).

Several specimens have been taken within our state. One found in market, at Washington by Mr. C. Drexler, in the spring of 1863, shot near Alexandria, Va., is now in the National Museum (A. C., 103–4). On July 11, 1890, an adult male was found in Washington Market, New York. It "had been shipped from Baltimore and doubtless was shot on the Chesapeake Bay," and is now in the American Museum of Natural History, N. Y. (Edgar A. Mearns, Auk. viii, 204). "On the property of the Carroll's Island Club, Baltimore County, Mr. Wm. Carpenter, on February 25, 1890, killed one of this species from a bunch of Baldpates. This bird has been mounted and is at present in my care" (L. S. Foster, Auk, viii, 283).

At a stated meeting of the Maryland Academy of Sciences, held April 5, 1880, Mr. Arthur Resler referred to a specimen of the European Baldpate which he had examined at the taxidermist store of A. Wolle, where it had been sent to be mounted. It was shot on the Atlantic coast of Maryland (Minutes of Maryland Academy of Sciences, 1880, 280).

Dr. Wm. H. Poplar has a specimen in his house at Havre-de-Grace. He told me that he shot that "Red-headed Baldpate" in November, 1881, and considered it a cross between a Redhead and a Baldpate.

Anas americana (137). Baldpate.

Common during winter, this species, as with nearly all of our ducks, is most numerous during fall and spring flights.

On September 23 ('93, Fisher) several bunches were noted at Sparrows' Point, and the last Baldpate was shot at Grace's Quarter on April 8 ('86, Ducking Record).

Inland, a male was taken in October '88, at Ridgley's Dam in Dulaney's Valley (Fisher). On November 4, '93, several bunches were on the Potomac, near Brunswick (Fisher), and it has been taken at Cumberland (Shriver).

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On October 3, '89, I witnessed a remarkable instance of the well-known sailing power of a dead duck, if shot in the heart with its wings spread. Fishing near Maxwell's Point, my attention was taken by several shots on Saltpeter Creek, and looking in that direction I noticed a duck coming down the wind, which was blowing fresh from a few points N. of W. As it got closer I noticed it was sailing, wings and neck at full stretch; when first seen it was well up and over the land, but gradually descending, it struck the water with a splash about one-quarter mile from our boat and near the centre of the river, or about two-and-a-half miles from where it was shot, the neck being about a mile across and Gunpowder River about three miles wide at this point.

Anas crecca (138). European Teal.

One shot on the Potomac River, near Washington, in April, 1888, was presented to the National Museum (Auk, iii, 139). It was an "adult male, shot by Henry Marshall, of Laurel, Md." (Smith. Report, '86, 154).

Anas carolinensis (139). Green-winged Teal.

Common during spring and fall migrations, a number stay in tidewater Maryland during mild winters. It is not so numerous as the following species, with which it arrives and departs. Mr. W. S. Walker, of Chestertown, writes me: "Among the last to leave Chester River is the Teal, or Partridge Duck, a little brown duck."

Anas discors (140). Blue-winged Teal.

Usually seen with, or in the same places as the last mentioned, and during the same time of year. A bunch of 15 were noted in Bear Creek, on August 20 ('93, Fisher). The latest date is May 7 ('90, Resler), when one was taken on Patapsco Marsh.

On September 17, '93, I saw a bunch of 10 on Loch Raven, in Dulaney's Valley. They were standing at edge of water,

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and allowed me to walk up opposite them. After observing them through a field glass for some time, I flushed them with a stone and they flew up stream a short distance. Following them in full view, I again got opposite and sat down, they appeared quite tame, and although my dogs paddled round in the water near them, they did not fly until I again threw a stone among them; evidently they had just arrived from the north and were tired out.

At Hagerstown, during April ('80, Small), and at Cumberland (Shriver).

Spatula clypeata (142). Shoveler.

Quite a number of "Broadbills" are shot during our gunning season, but they cannot be said to be common. I have no characteristic dates. A pair were taken at Gunpowder River, on March 27, ('95, Resler). Not uncommon at Washington during winter (Richmond); at Cumberland (Shriver).

Dafila acuta (143). Pintail.

Common during fall and spring flights, I believe some stay with us during mild winters. Mr. N. S. Bogle, of Eastern Neck Island, writes me, that "a flock of 15 Sprigtails arrived in Chester River, on September 13 ('93), these were the first ducks." They are noted from that on to October 28 ('93). On March 4 ('94, Fisher), about 20 were in a bunch on Bird River, and several were taken on Choptank River on April 7 ('94). Loch Raven (Dukehart).

Aix sponsa (144). Wood Duck.

Sparingly resident, this species is numerous in spring and fall. While usually seen "down the necks," single birds or pairs are often flushed from pools on very small runs, the principal attraction apparently being oak woods. Some years ago, in May, on Hog Creek, a female and eight young were observed (Fisher), and Mr. P. A. Bowen, writing from Aquasco, Prince George's County says, "resident, there are now in this neigh-

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borhood three birds, hatched in confinement from eggs taken from a hollow tree."

Resident but not common, at Washington (Richmond); Hagerstown (Small); Cumberland (Shriver).

Aythya americana (146). Redhead.

Common during winter in tidewater Maryland. They arrive earlier, but the first date I have is October 3 ('89), when an enormous number of ducks were "bedded" on Gunpowder River, below Maxwell's Point, quite a large number of them being Redheads. As late as May 2 ('95, Tylor), about 150 were on Gunpowder, near Magnolia, in five or six small bunches. Inland, they are numerously recorded. About 10 years ago 500 or 600 stopped for a few days on Lake Roland (Fisher); on March 29 ('91), several small bunches were on Loch Raven (Wholey), and a number have been taken in Dulaney's Valley (Dukehurt). On November 4 (93), a few were on the Potomac near Knoxville (Fisher), and they are given as occasional at Cumberland (Shriver).

Aythya vallisneria (147). Canvasback.

Still a common winter resident of tidewater Maryland, though most numerous during fall and spring flights.

On October 3, 1889, quite a large number where with the Redheads, Blackheads, etc., bedded on Gunpowder River, and they have been taken at Grace's Quarter from October 21 ('80) to April 4 ('86, Ducking Record), but no doubt some remain later.

Aythya marila nearctica (148). American Scaup Duck.

Common on the Chesapeake and its numerous arms during winter. On October 3, 1889, a number were with the other ducks on Gunpowder River, and on March 25, 1894, I watched a most affectionate pair, male and female, for some time at Cedar Point. It also occurs inland, about 200 were on Lake Roland October 29 ('92, Fisher). Dr. Owings, of Ellicott

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City, shot one on his ice-pond in November, 1893. Loch Raven (Dukehart); Harpers Ferry, a bunch of six, November 6 ('93, Fisher); Cumberland (Shriver).

Aythya affinis (149). **Lesser Scaup Duck.**

Arriving and departing with the former species, this is much the more numerous, and both with the following, are generally classed together by gunners. At Grace's Quarter, "Blackheads" are recorded as being shot from October 3 ('89) to April 8 ('86) and, as with all other ducks, the "Blackheads" are most numerous during the fall and spring flights. On April 2 ('90, Richmond) one was taken near Washington. On April 5 ('95) one was taken at Cumberland (Zacharia Laney).

Aythya collaris (150). **Ring-necked Duck.**

Not very numerous. I presume it arrives with the other "Blackheads." All the notes I have range between March 8 ('94), when one was shot at Bush River by Mr. Melville Wilson, who called it a "Creek Blackhead," and April 4 ('91, Wholey), when one was shot in the open river below Fort McHenry.

Glaucionetta clangula americana (151). **American Golden-eye.**

Common in tidewater Maryland, from October to April, I have not any extreme dates. Mr. Dukehart has frequently shot them at Loch Raven and they have been taken at Hagerstown on December 28, 1879, and April 15, 1883 (Small).

Glaucionetta islandica (152). **Barrow's Golden-eye.**

This northern species coming south in winter to New York, has in one recorded instance straggled as far south as Maryland. "A female shot on the Potomac River, opposite Washington, Nov. 22, 1889, by C. Herbert, is now in the collection of J. D. Figgens" (C. W. Richmond, Auk, viii, 112).

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Charitonetta albeola (153). Bufflehead.

Common in winter, arriving the latter part of September, one was at Patapsco marsh on May 7 ('90, Resler).

On February 15, 1895, just after the blizzard, one came up the harbor into the upper basin and stayed round off Bowley's wharf for a long time. Inland, it has been taken at Sandy Springs in April (Stabler); a pair were seen near Harper's Ferry on October 10 ('93 Fisher), and they have been shot at Cumberland (Shriver).

Clangula hyemalis (154). Old Squaw.

Common in winter on the Chesapeake; I noted one at Fort McHenry on October 27, ('94), and they remain with us until late in April. On March 4, 1895, there were several hundred in the mouth of Chester River on broad water, nearly all in pairs, but occasionally a few males were in a bunch by themselves. As the steamboat was running before a terrific snow squall, we got quite close before they flushed. Often they dived and on coming up appeared to be flying before they emerged. On the 6th it was blowing a gentle breeze, and although they were extremely numerous, we did not get close to any.

Loch Raven (Dukehart).

Camptolaimus labradorius (156). Labrador Duck.

Now extinct, they were apparently quite numerous in Audubon's time, for he says (vi, 329): "The range of this species along the shores does not extend further southward than Chesapeake Bay, where I have seen some near the influx of the St. James River. I havealso met with several in the Baltimore market."

Somateria dresseri (160). American Eider.

"Winters southward to Delaware" (Chapman, 117). "In the old collection of the Maryland Academy of Sciences was a specimen from Maryland, collected at Pamunkey Neck, below Marshall Hall, by Mr. Chapman" (P. R. Uhler).

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Somateria spectabilis (162). King Eider.

"South casually to New Jersey, in winter" (Manual, 110). A young bird of this species was obtained at Cobb's Island, Va., by Captain C. H. Crumb, on December 19, 1899" (Birds Vas., 48).

Oidemia americana (163). American Scoter.

Common during fall and spring flights, on ocean front and broad waters of tidewater Maryland, a few may winter. On November 4, ('94) four spent the evening in the basin, and on November 17 ('77), Major Hill presented a specimen in the flesh to the Maryland Academy of Sciences. On March 8 ('94), one was in Saltpeter Creek, and they were numerous on open water. Late in April, and early in June they are reported as being fairly numerous at Havre de Grace.

During Christmas week ('90) they were fairly common at Eastville, Northampton County, Va. (Ridgley Duvall, Jr.).

Oidemia deglandi (165). White-winged Scoter.

Fairly common on the Chesapeake during spring and fall, this species may winter with us. On September 12 ('94), four were noted in Chester River by Mr. E. Speddin of the tugboat Chicago, and on November 6 ('94), a pair were shot down the Necks, which I saw in market the next day.

On March 6 ('93), I saw three in a bunch off Love Point lighthouse, at the mouth of Chester River, they did not flush until the steamboat was close to them, in marked contrast to the South Southerlies; on May 12 ('94, Fisher), 3 were at the mouth of the Patapsco.

Oidemia perspicillata (166). Surf Scoter.

Arriving and departing with the others, I can give no characteristic dates. The three being as a rule classed as "tar-pots" or "bay muscoveys" and not being considered good for anything are seldom shot.

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"Common winter resident off the New Jersey coast from October to late in April. Apparently the most abundant species of Scoter" (Birds E. P. and N. J., 59).

Erismatura rubida (167). Ruddy Duck.

Common during spring and fall. I have no winter dates, though possibly it remains with us. A bunch of 4 or 5 was seen in Baltimore harbor close to the Pennsylvania Railroad pier, at the foot of Caroline street, early in the morning of September 25 ('94) by Mr. E. Speddin, of the tugboat Chicago, and they were numerous until November 14 ('94, Patapsco Marsh). On March 8 ('94), between two and three hundred were bedded off Grace's Quarter, and on June 9 ('94), a bunch of six were still off Ocean City.

Fairly common on fresh water, this species has been taken as follows: On October 29, '92, two at Lake Roland (Fisher), and three from a bunch of five at Powhatan Dam (Gray). Several have been shot at Loch Raven (Dukehart), and on November 5, '93, a pair were on the Potomac near Knoxville (Fisher).

Chen hyperborea nivialis (169*a*). Greater Snow Goose.

"Along the Atlantic coast it may be considered rare" (Birds N. W., 549). On April 26, '80, Mr. Mitchell, of Cecil Co., presented a specimen to the Maryland Academy of Sciences; at Legoe's Point one was noted on March 10, '90, and early in October, '90, two flew over the bridge at Sparrows' Point, about 40 feet up (Fisher).

Anser albifrons gambeli (171*a*). American White-fronted Goose.

Rare straggler. One shot on the Potomac in 1856 was bought in the Washington market for the Smithsonian (Smith. Rept., '56, 68).

On Nov. 12, '92, a young male was shot at Grace's Quarter, Baltimore County, by Mr. Charles D. Fisher, and by him pre-

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sented to the Maryland Academy of Sciences. It was flying alone and came in to decoy's answering the usual goose call.

Branta canadensis (172). Canada Goose.

Common winter resident. On October 4 ('94), four were seen sitting on a log at Spry's Island, by George B. Fowler, and on the 20th ('94), they were "exceedingly numerous in Day's Hollow on Gunpowder River; when they flew up it sounded like thunder; a few days later they had all left" (Edw. A. Robinson). They remain with us during winter in rather more limited numbers, and are again numerous in early spring, the latest record being April 10 ('90, Resler).

Inland, they are liable to be found anywhere in the state during spring and fall flights. On November 5 and 6 ('93, Fisher), quite a number were on the Potomac between Knoxville and Brunswick, and on April 15, 16 and 17, ('83, Small), the reservoir at Hagerstown "fairly swarmed with them."

In New Jersey "some linger as late as May 12" (Birds E. Pa. and N. J., 60).

Branta canadensis hutchinsii (172*a*). Hutchin's Goose.

"South in winter through United States, chiefly west of the Alleghanies" (Manual, 117). "A goose, from its small dimensions and 16 tail feathers apparently referable to this sub-species, was taken at Cobb's Island, in the winter of 1888–89 by Capt. Crumb" (Birds Vas., p. 49).

Branta bernicla (173). Brant.

Arriving and departing at about the same time as the common goose, this species is not so abundant. Most numerous during spring and fall migrations, quite a number as a rule winter with us, but I have no characteristic dates.

Branta nigricans (174). Black Brant.

"Very rarely straggling to the Atlantic coast" (Manual, 118), this species has been taken on the New Jersey coast (Birds

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E. Pa. and N. J., 60) and "Capt. Crumb informs me that it is usual for one or two to be obtained at Cobb's Island nearly every winter" (Birds Vas., 49).

Olor columbianus (180): Whistling Swan.

Common winter resident on the broad waters of tidewater Maryland, and during spring and fall flights liable to be seen anywhere in the state. On September 26 ('93), one was shot on the Potomac near Weverton, by John Leopold. On November 4 ('93, Fisher), several bunches were at the same place, while on April 15, 16 and 17, ('83), two were on the reservoir at Hagerstown (Small).

While swans are more or less difficult to shoot, they often "bed" on broad water out of range in large numbers. On January 20, '94, I counted 82 standing on ice at the mouth of Gunpowder River, and a week later 194 on the water at the same place, where I am told they at times appear in greater numbers.

Olor buccinator (181). Trumpeter Swan.

Casual on the Atlantic coast. "In Turnbull's list (Birds E. Pa.) this species is included on the authority of reliable sportsmen who have shot it on the Chesapeake Bay" (Birds N. W., 545).

In the Oologist, Vol. vi, 15–16, is quite an interesting article on the taking of one from a bunch of 12 or 15 on Slaughter Beach Marsh, Del., by Mr. G. L. Stevens, of Lincoln, Del., on November 9 ('89), at which time they were flying southward.

Order HERODIONES.—Herons, Storks, Ibises, Etc.

Family Ibididæ—Ibises.

Guara alba (184). White Ibis.

Regularly north to the Carolinas in summer and casually to Long Island; two have been recorded from New Jersey and one from Pennsylvania (Birds E. Pa. and N. J., 61).

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Plegadis autumnalis (186). Glossy Ibis.

"Warmer parts of the Eastern Hemisphere, also more southern portions of the Eastern United States" (Manual, 124). "At very irregular periods in the spring, small flocks have been seen on the coast of the Middle States, and on the Eastern Shore of Maryland and Virginia," and one taken near Baltimore, and two in the District of Columbia in 1817 are mentioned (Water Birds of N. A., i, 95–6).

Family CICONIIDÆ—Storks.

Tantalus loculator (188). Wood Ibis.

Regularly "north to the Carolinas, casually to Pennsylvania and New Jersey" (Key, 653). "The late Judge Libhart, in his ornithological report of Lancaster Co., Pa., says: "I obtained a fine specimen of this species shot from a troop of 10, by Mr. M. Ely, on the Susquehanna, in July 1862," and "Dr. A. C. Treichler, of Elizabethtown, has specimens in his collection which were shot in Lancaster Co. in the early part of July, 1883, shortly after severe storms" (Birds Pa., 53). "On July 2 1893, Mr. Fred. Zoller brought me 2 females, adult and young; they were killed on the flats a short distance from the Washington monument, and on the Maryland side of the Potomac" (E. M. Hasbrouck, Auk, x, 92). Two were taken near Bloomery, Hampshire Co., W. Va., by Dr. A. Wall (American Field, xxii, 82).

Mr. Robert Shriver, of Cumberland, writes me: "About 30 years ago I shot a Wood Ibis. This was the only specimen I ever saw; it was first seen by myself near the Potomac River bank, but before it was captured a dozen hunters were after it and it evaded them for several days. I always valued this specimen highly and am sorry it has gone 'the way of all flesh.'"

On October 15, 1893, Mr. Jacob F. Saylor described a bird to me taken during "wheat harvest" at the bend of the Gunpowder Falls in Dulaney's Valley, Baltimore Co.; from his description, and later corroboration by Mr. Dukehart, I am satisfied it can be no other than this species.

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Family ARDEIDÆ—Bitterns and Herons.

Botaurus lentiginosus (190). American Bittern.

Fairly common during spring and fall, a few spend the summer with us and possibly breed. It may also stay over winter during mild seasons. From March 25 ('93, Gray) they are numerously noted until May 5 ('93, Resler), and in fall from September 1 ('91, Tylor), when one was taken at Tuckahoe Creek until October 10 ('94), when one was caught alive by Mr. Jacob Kirkwood early in the morning in front of No. 103 Elliott street in Baltimore City. This he kindly kept in a box until I examined it. It was an ordinary sized dark plumaged male.

Mr. J. E. Tylor supplies me with the following items: "Between the 20th and 30th of August, 1891, I killed a male Bittern in the Adkin's woods, one mile south of Easton, and mounted same. On the first day of September, 1891, Dr. E. R. Trippe, of Easton, in company with A. G. Pascault, of the same town, shot a male Bittern in Tuckahoe Creek, five miles below Hillsboro; this I also mounted. On July 14, 1894, on Hog Creek, Gunpowder River, I flushed one from the marsh, but did not secure it."

"Mr. William H. Buller, residing at Marietta, Lancaster County, Pa., in a letter dated July 29, 1889, addressed to me, writes as follows: 'I am inclined to believe that the American Bittern breeds in the vicinity of Schock's Mills, a few miles west of Marietta; while I have never found its nest, or seen its young, yet I have so frequently seen the bird in that vicinity during the summer, that I think it probable that it breeds there'" (Birds Pa., 55).

Dr. Coues, speaking of the District of Columbia, says: "Resident and rather common" (A. C., 100), and "I have procured it in January at Washington" (Birds N. W. 529). "Rather common from August to April at Washington" (Richmond).

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Ardella exilis (191). Least Bittern.

Common during summer, this little bird is seldom seen except by those who look for it, and owing to the marshes in which it lives, not always to be found by those who do.

On May 12 ('94, Wholey), six were noted in Patapsco Marsh, but that they are here earlier is shown by nests containing 5, 3 and 1 eggs, respectively, which were noted at the same place on May 17 ('93, A. Wolle), and in the last week of September, 1894, one was brought to A. Wolle, who kept it alive for some time in his shop window. The latest date for eggs is July 8 ('92), when four nearly fresh were collected at Sparrow's Point. It also possibly occurs more or less regularly on inland swamps. In May, 1893, one was caught alive in Dulaney's Valley by Mr. Dukehart.

Ardea herodias (194). Great Blue Heron.

Between March 30 ('93, Gray) and November 19 ('90, Resler) this species is noted with more or less regularity, but so far I have been unable to find a "heronry" in Maryland.

In winter it has been observed at Back River on December 7 and 21 ('92, Resler). Noted at Hagerstown (Small), and Cumberland (Shriver).

Ardea egretta (196). American Egret.

Irregular during late summer and early fall, this species has been noted from July 5 ('82), when one was at Gunpowder Falls a short distance below the Belair Road, to September 1 ('93 A. Wolle), when one was at Gunpowder Marsh; on September 23 ('94, Tylor) two were at Ocean City.

In Dulaney's Valley, one out of a flock of 9 was shot by Mr. Thos. Peerse in front of his house, and another was taken by Mr. Dukehart in the fall of 1893.

Possibly some may nest in Maryland, as "Mr. Wm. Palmer has known this species to nest in Arlington Cemetery, Va." (C. W. Richmond, Auk, v, 19), and "up to 1877 they bred

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near Townsend's Inlet, N. J. (Scott, B. N. O. C., '79), and a few may still breed in the state" (Birds E. Pa. and N. J., 63).

Ardea candidissima (197). Snowy Heron.

Not as numerous as its larger relative, it probably visits us about the same time of year. On August 3 ('89, Resler), one of 6 was shot at Middle River, and on August 7 ('80, Resler), another at Back River. On August 10 ('88, Tylor), one at Choptank River, and later in same month another near Greensboro. On August 25 ('93), one near Marlboro, by Richard Cantler. At Washington it is given as "not uncommon about the marshes of the Potomac towards the end of summer and early fall" (A. C., 98). In 1886 they were breeding at Seven Mile Beach, N. J. (H. G. Parker, O. and O., iii, 138).

Ardea tricolor ruficollis (199). Louisiana Heron.

"Warmer portions of Eastern North America; north, casually to New Jersey" (Manual, 131). "Turnbull states that it has occasionally been taken on the New Jersey coast, but we can find no records of recent captures" (Birds E. Pa. and N. J., 64). "I have in my possession a skin of an immature bird taken several years ago at Cobb's Island, and understand from Captain Crumb that he has heard of 2 others that have been seen or taken" (Birds Vas., 50).

"A printed record (I cannot give reference) says one was preserved in the Maryland Academy of Sciences that was shot in Maryland" (Richmond). Mr. Uhler has very distinct recollections of the reception of this specimen, but cannot recall particulars; it occurred in 1868 or '69.

Ardea cœrulea (200). Little Blue Heron.

Rare straggler from the south; I know of but one specimen taken near Baltimore, this was shot at Day's Marsh, on October 7, 1892 (Fisher). Others no doubt have been taken and possibly some in the white plumage have been noted under Snowy

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Heron. At Washington, it is given as "rare and only casual towards the end of summer" (A. C., 99), and "although usually rare, it is sometimes extremely abundant, a flock of about 150 frequenting the shores of the Potomac during August 1875" (P. L. Jouy, Field and Forest, iii, 51).

Ardea virescens (201). Green Heron.

Common summer resident, arriving the last of March, a nest ready for eggs was found April 15 ('91), and as late as October 12 ('89, Resler), one was taken at Back River. I have found eggs in the nest from April 22 ('81), to June 12 ('94); sets are 4 of 3, 13 of 4, and 8 of 5. On several occasions, in different parts of the state, I have come across "heronries" of this species, the number of nests ranging from 6 to 17, but single nests may be found scattered everywhere, usually near marshy land, or water.

Nycticorax nycticorax nævius (202). Black-crowned Night Heron.

Locally common, otherwise rare, from April 1 ('93, Gray) to October 17 ('94, Resler). Only a few miles from Baltimore city a colony has nested for several years of which Mr. G. H. Gray, supplied the following: "More than 6 years ago information of the approximate breeding site was received. It was not until April 16, 1892, however, that it was found, when about 30 nests were in various stages of completeness. They were in slender black oaks, near the top, and about 50 feet from the ground. On April 30 the majority contained eggs. 2 had 5; 3 had 4, 10 or 12 had 3; the others 2 or 1. On June 24, many of the young were perched about the limbs of the nest trees while others were still on the nests. On March 25, 1893, none had arrived, but on April 1, seven were seen. On May 6, nests with eggs were found in a clump of small scrub pines adjoining the oaks, which they had vacated. A few days previous to our visit a severe wind storm had shaken these pines and the

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ground was strewn with broken egg shells. One nest however, had 5 eggs and they ranged down to 1 or more; while 2 nests were not yet completed. I measured the height of 11 nests and found they ranged from 36 to 49 feet from the ground. On June 9 they were nearly all back in the oaks occupying the old nests where they had birds just hatched, the few in the pines containing birds 10 or 12 days old. Among the oaks the shells of three eggs were found under 30 nests, the other 6 had 1 or 2, but possibly a few eggs were not yet hatched. The night of July 30 was spent in this heronry, but as the moon set early nothing could be seen. Each nest however, seemed to be visited by the parents about once every hour and the noise the young made was something wonderful.

"Owing to changes they did not nest here in 1894, but they were found in 1895 located about a mile off, as the crow flies, again in black oaks, the nests being from 42 to 48 feet up. On May 5 a few nests showed eggs, 4 and 5 being noted, while on May 11, 3 were noted with 4 fresh, one with 4 nearly fresh; one with 5 nearly hatched, one with 4 young and a rotten egg, one with 3 and another with one fresh egg."

"Wm. Palmer has known this species to nest in Arlington Cemetery" (C. W. Richmond, Auk, v, 20). "Occasional in winter" (Richmond).

Nycticorax vialaceus (203). Yellow-crowned Night Heron.

A few have been taken in Pennsylvania and New Jersey, where it is regarded as a "very rare straggler from the south" (Birds E. Pa. and N. J., 65).

"Rare summer visitant in the coast region; I have examined a young bird that was taken at Cobb's Island, and think that another bird has been taken there" (Birds Vas., 51).

Order PALUDICOLÆ.—Cranes, Rails, Etc.

Family Gruidæ—Cranes.

Grus mexicana (206). Sandhill Crane.

"Rare or irregular in the east" (Key, 667). "A specimen of this bird has been procured in the District of Columbia. We

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doubt, however, that the bird has been seen here alive for the past quarter of a century, and it might properly be retired from the active list" (A. C., 100).

Family RALLIDÆ—Rails, Gallinules and Coots.

Rallus elegans (208). King Rail.

Fairly common summer resident of our fresh and brackish marshes. At Patapsco Marsh they have been taken from May 17 ('93) to October 6 ('76, Resler), while on October 13 ('94) I saw a small box of mixed game from Cumberland opened, among others it contained one King Rail.

At Tolchester, on May 30 ('91, Fisher), a nest containing 6 fresh eggs was found, and on June 15 ('91, Fisher), another with 10 fresh eggs at the some place.

Possibly some may winter during open seasons; *vide*—"Two King Sora were brought to Fredericksburg, Va., on Saturday (Jan. 28, '93), by Mr. Geo. Newton, of Stafford, and presented to Capt. M. B. Rowe. The appearance of these birds at this season is said to be quite remarkable, as they generally leave on the first appearance of frost" (Va. item in the *Sun* paper). Stafford is about 6 miles from the Potomac. In January, 1895, Mr. Scoggins received two King Rail "from the Rappahannock."

Rallus longirostris crepitans (211). Clapper Rail.

Possibly resident in southern Maryland except when driven out by severe frost; this species, where not persecuted by pot hunters is fairly numerous on salt water marshes during summer. On May 17 ('93), 3 were shot on Patapsco Marsh, one, a female, contained a large number of eggs in the ovary, some quite large, and one in the ovaduct already spotted and ready for extrusion. Noted at Hagerstown in October, '79 (Small).

Rallus virginianus (212). Virginia Rail.

Common during migration, a few remain during summer. On July 8 ('92, Wholey) a specimen was taken at Sandy Point, near

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Ocean City, and at Washington it has been "seen during the breeding season and undoubtedly breeds" (C. W. Richmond, Auk, v, 20).

Mr. Stone's remarks apply equally well to Maryland, he says: "Summer resident in fresh marshes, bogs and swamps along the coast, though apparently not in the true salt marshes except in migrations not very abundant inland, but rather plentiful along the New Jersey coast; arrives May 1st and remains until October 25, or occasionally later" (Birds E. Pa. and N. J., 66).

On March 20, '95, in market I saw one with a bunch of Wilson's Snipe; they were perfectly fresh and may have been shot near Baltimore, but I could not ascertain locality.

Porzana carolina (214). Sora.

While this species migrates north regularly in spring, it is seldom noted, as the gunners are not then on the marshes, but during August, September and October, they are slaughtered by thousands on the marshes of tidewater Maryland.

On August 25 ('94, Fisher) they were abundant on Day's Marsh, they remain so until the first frost; this of course makes their going further south a variable date. Other dates are few, so they are given in full. On November 18 ('90, Fisher) one was shot in Somerset County. Single birds were taken on December 26 ('90) and January 22 ('95), at the mud hole back of "Sonny" Barranger's in Canton, by Mr. Jas. Holton, and on April 3 ('93) one was shot in a marsh a short distance north of Chincoteague Island, and consequently near the southern Maryland line, by Dr. R. H. P. Ellis, of Baltimore city.

On July 25, '93, four birds were flushed from a small piece of cattail, by Mr. Geo. Todd, close to his house on North Point. This seems to point to their possible breeding here in limited numbers. It is given as breeding in Chester and Lancaster Counties, Pa. (Birds Pa., 71), and at Washington it has been "seen during the breeding season and undoubtedly breeds" (C. W. Richmond, Auk, v, 20). Under date of May 25, '95, Mr.

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Richmond says: "I doubt very much now whether it ever breeds here, but it is common in August. Birds have been shot here, one on November 8, '78, by Peter Burger, one on November 9, '78, by S. F. Baird, and one in March, '75."

Inland, several were shot during the fall of '93, in Dulaney's Valley (Dukehart); at Hagerstown, in October, '79, and September, '80 (Small); at "Cumberland during all of April (not seen after May 1, as shooting stopped then), and from August to October 15, '94" (Zacharia Laney).

Porzana noveboracensis (215). Yellow Rail.

"Eastern North America, not abundant, very secretive" (Key, 674), and as the bird is small it is no wonder it is not often seen; possibly it may yet be found to breed with us. On April 27, '93, one was shot on Patapsco Marsh by Richard Cantler, this I saw. On May 18, '89, at Hog Creek Marsh, Harford County, one was flushed twice but not secured, by Mr. W. H. Fisher, and on October 20, '94, one was presented to me in the flesh; it was received with a mixed lot of birds, in a box sent from Back River Neck by a market gunner.

"In the collection of the National Museum are two Yellow Rails, both of which were taken on the marshes of the Potomac River near Washington, the first by T. E. Clark, October 4, '79, the second by A. S. Skinner, March 28, '84" (H. M. Smith and Wm. Palmer, Auk, v, 147).

Porzana jamaicensis (216). Black Rail.

"Not often found in the United States, being one of our rarest birds" (Key, p. 674). One secured at Piscataway, Maryland, was presented to the Smithsonian Institute by John Dowell, of Washington, D. C., (Smith. Report, '84, 145). "One seen in the District of Columbia during September, '61, but not secured. One taken 2 or 3 years ago is now in the Smithsonian" (A. C., 101). Several are recorded from Pennsylvania and New Jersey, (Birds E. Pa. and N. J., 67).

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Ionornis martinica (218). Purple Gallinule.

"South Atlantic and Gulf States, resident, north casually to New England" (Key, 676). Capt. Crumb has one mounted that came ashore on Cobb's Island during a storm in May '91, and was captured in the light house yard (Letter to W. H. Fisher). It has also been taken in York County, Pa. (Birds Pa., p. 73).

"One was seen in Centre market (Washington, D. C.) on August 24, '89 by Geo. Marshall. I visited the market, (Golden's stand) to see about it. The man in charge remembered the 'purple bird,' but thought it had been sold, he said it came from 'down the Potomac somewhere'" (Richmond).

Gallinula galeata (219). Florida Gallinule.

Possibly a regular, though rare, migrant. At Stemmer's Run, Baltimore Co., one was taken on May 8, ('89, Resler). At Wasington, "on April 19, '92, Mr. Fred Zeller brought me a Florida Gallinule; while the species has been taken here before, this is the first specimen existing in collections. A few days later, about the 22d, Mr. J. D. Figgins secured a specimen from Frederick, Md., and on August 12, '92, Mr. Zeller brought me a young male" (E. M. Hasbrouck, Auk, x, 92).

"Regular transient, but not very common, most of the specimens secured in Pennsylvania and New Jersey have been taken on the Delaware and Susquehanna Rivers. Occurs May 1–10, and September 8 to October 20" (Birds E. Pa. and N. J., 68).

Fulica americana (221). American Coot.

Common migrant, noted from March 14 ('93, Fisher), at Gunpowder Marsh, to May 7 ('93), when a bunch of 5 were on the broad water of Chester River, and again from September 20 ('79, Resler), at Back River, to November 3 ('91, Resler), at Patapsco Marsh.

A number have been shot at Loch Raven (Dukehart). At Hagerstown, on April 16, '83, there was a remarkable flight of

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these birds, hundreds being killed; they were also noted during September and October, '79, and October, '81 (Small).

Order LIMICOLÆ—Shore Birds.

Family Phalaropodidæ—Phalaropes.

Crymophilus fulicarius (222). **Red Phalarope.**

"A species of circumpolar distribution during summer" (Key, 614). "South in winter to Middle States" (Manual, 144). "A young bird taken on the Eastern Branch of the Potomac near Washington, D. C., by Mr. F. S. Webster, on October 17, '85, is now in the National Museum" (Smith. Report, '87, 603).

Phalaropus lobatus (223). **Northern Phalarope.**

Circumpolar, like the last species, but coming much further south in winter. Under date of May 28, '95, Mr. C. W. Richmond writes me from Washington, "one was taken here in September, '91, by Mr. Thomas Marron off Navy Yard bridge; the specimen is now in the National Museum."

Family Recurvirostridæ—Stilts.

Himantopus mexicanus (226). **Black-necked Stilt.**

Uncommon on the Atlantic coast from Florida to Maine; now rare, it may yet occur on the ocean front of Maryland. "Formerly it bred regularly in Cape May County, N. J., and on Egg Island, Delaware Bay (Turnbull, '69). We know of no recent captures of this species" (Birds E. Pa. and N. J., 70).

Family Scolopacidæ—Snipes, Sandpipers, etc.

Scolopax rusticola (227). **European Woodcock.**

Straggling from Europe, this species has been taken quite close to Maryland, but as far as I know not within the state. "In the early part of November, '86, Mr. D. N. McFarland,

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of West Chester, Pa., killed a large female in the 'barrens' of East Nottingham Township, Chester County, Pa." (Birds Pa., 78), and Dr. Coues reports one being shot in Loudoun County, Va., in '73 (Forest and Stream, vi, 180).

Philohela minor (228). American Woodcock.

Resident, except when frozen out, and fairly common in spite of the June and July gunners who slaughter many birds before they are much more than half grown, and leave others still younger parentless.

Nesting dates range from March 30 ('80), when four slightly incubated eggs were found by Mr. W. L. Amoss near Fallstown, Harford County, to July 4 ('93), when a nest, also with four eggs, was found (all sets I know of are four).

At Cumberland, where they are not found in winter, the first was shot on March 28, some years ago, and the last on December 12, '94 (Zacharia Laney).

Gallinago delicata (230). Wilson's Snipe.

Common during migrations. On February 24, '95, I flushed one from a warm spring in Dulaney's Valley, and on March 9 ('95, Henninghouse) they were numerous at Gunpowder Marsh, where they were still numerous on April 22 ('92, Pleasants), the last spring date being April 29 ('94), in Dulaney's Valley, though at Washington they are noted until May 5 (Richmond).

In the fall I have them noted from September 20 ('93), at Patapsco Marsh, to December 11 ('94), Bush River. There is every possibility that more or less remain with us during mild winters.

The following note on this species breeding in Maryland is taken from Lewis' *American Sportsman*, (1885 edition, p. 244). "In the month of May, 1846, while wandering in company with Mr. E. Lewis over his extensive estate in Maryland, we sprang a Wilson's Snipe from the midst of an oat field, and being surprised as well as attracted by its singular manœuvres,

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we made search for its nest which we soon found with four eggs in it. The situation selected for incubation could not have been better chosen in any portion of the country, as it was on a rising piece of ground, with a southern exposure, protected in the rear by a large wood, and at the foot of the high ground was a considerable extent of low marsh meadow watered by a never-failing stream, along the border of which the anxious parent at any time could obtain a bountiful supply of food."

Mr. Zacharia Laney, of Cumberland, informs me that he has taken this species from February 28 to the last of the gunning season, April 30; how much later they stay he does not know, but some years ago while exercising a pair of young dogs in June, they flushed a pair from a marshy slew.

Macrorhamphus griseus (231). Dowitcher.

Common during migration in tidewater Maryland during April and May, and from early in August to the first touch of cold weather; a specimen in the collection of Mr. A Resler was taken at Back River as early as March 6 ('75). Inland, Mr. Dukehart has secured a number in both spring and fall in Dulaney's Valley.

Macrorhamphus scolopaceus (232). Long-billed Dowitcher.

Of this western species "seven were killed from a flock on the Anacostia River, D. C., in April, 1884, by a gunner who sold them in the market for Jack Snipe. One similar to the others was secured and mounted by one of the writers and has been identified by Mr. Ridgway as the western species" (Hugh M. Smith and Wm. Palmer, Auk, v, 147).

Micropalama himantopus (233). Stilt Sandpiper.

Casual migrant on the Atlantic coast, one was "taken on the Patuxent River, Md., September 8, '85, by Mr. H. W. Henshaw. This capture was made beyond the regular District of Columbia

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boundary, but was, however, included in what has been tacitly regarded as its faunal and floral limit" (Hugh M. Smith, Auk, iii, 139).

Tringa canutus (234). Knot.

Common migrant, given on the New Jersey coast from May 15 to June 1, and from August 15 to September 15 (Birds E. Pa. and N. J., 73). On Cobb's Island 19 were shot on May 20 ('91, Fisher), and from May 14 to 28 ('94), they were "quite numerous occurring in large flocks. On May 25 hundreds of these birds were seen feeding along the extensive mud flats on the outer sea beach" (E. J. Brown, Auk, xi, 259).

On August 19, '93, quite a number were shot a few miles south of Ocean City on the beach (Janon Fisher).

Tringa maculata (239). Pectoral Sandpiper.

"United States chiefly during migrations, when observed in wet grassy meadows, muddy ponds, flats, etc." (Key, 626). "Rare in spring, not uncommon from September 25 to November" (A. C., 96.)

Near Washington, "on April 22, '88, two were shot by W. F. Roberts; several were taken on August 3 (about '89); at St. George's Island, Md., several were seen on September 3 and 11, '94; and one was shot October 22, '60" (Richmond).

"Regular migrant on the New Jersey coast in April, and from the middle of August to the first of October; occasional in the interior" (Birds E. Pa. and N. J., 73).

Tringa fuscicollis (240). White-rumped Sandpiper.

"Transient on the New Jersey coast, but not very common, associating with the Least Sandpiper, and arriving and departing with it" (Birds E. Pa. and N. J., 73).

"E. J. Brown has two or three skins taken in May, between the 15th and 24th, '94, at Smith's Island, Va." (Richmond).

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Tringa bairdii (241). Baird's Sandpiper.

Migrant, "rare on the Atlantic coast, common in the interior" (Key, 626). "One was shot by R. S. Matthews, near Four Mile Run, Va., on September 3, '94, and Wm. Palmer shot a second specimen on September 25, '94, at the same place" (Richmond).

Tringa minutilla (242). Least Sandpiper.

Common migrant all through May, and again from August 2 ('92), [in New Jersey, Stone says July 15] to November 3 ('94), when four were shot at Back River. Numerous along the shores of tidewater Maryland, bunches of "Peeps" may be found along all our rivers, streams, runs, ice ponds, etc., wherever there is wet mud.

Tringa alpina pacifica (243*a*). Red-backed Sandpiper.

Common during migrations in tidewater Maryland; this species has also been noted on our larger inland waters; possibly some remain during mild winters in southern Maryland. On September 3 ('93), one was at Loch Raven, and on the 17th, two. On March 13 ('92, Wholey) four were at Waverley, while on May 24 ('93), I shot two out of a bunch of four on Hail Point, Kent County, at the mouth of Chester River.

Ereunetes pusillus (246). Semipalmated Sandpiper.

Common during migrations, but not as numerous as *T. minutilla*, with flocks of which it is generally found, arriving and departing at the same time.

Near Washington, D. C., recorded from August 13 ('94) to October 26 ('87), and again in May (Richmond).

Ereunetes occidentalis (247). Western Sandpiper.

"During the last week of August, 1885, I found the western bird quite as common as the eastern at Piney Point, St. Mary's County, Md., on the Potomac River. If anything, the former was the most numerous, for, of the 18 specimens of

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Ereunetes preserved, 14 were identified by Mr. Ridgway as *occidentales*, and these too were taken at random from a lot of about 25 dead birds" (Hugh M. Smith, Auk, xi, 385). Several were shot at Virginia Beach, on September 6 and 7, 1884, by Messrs. Henry Seebohm and C. W. Beckham (Auk, xi, 101). Two have been taken in New Jersey: one on September 14, '80, the other on May 17, '92 (Birds E. Pa. and N. J., 75).

Calidris arenaria (248). Sanderling.

Abundant coastwise during migrations; several were seen and one shot at Cobb's Island on May 20 ('91, Fisher), and one was taken at Ocean City on September 23 ('94, Tylor).

"Near Washington one was taken on September 23, '94, by Wm. Palmer; another in '74, and one on October 24, '85, at Gravelly Run" (Richmond).

"Abundant transient on the New Jersey coast, keeping pretty much to the beach, April 18 to June 1, September 14 to October 15. Some also are said to remain through the winter. Dr. W. L. Abbott secured one specimen in the spring migration as late as June 13. Occasional on the lower Delaware" (Birds E. Pa. and N. J., 75).

Limosa fedoa (249). Marbled Godwit.

This species "does not appear to go far along the Atlantic coast northward" (Key, 635). Rather rare transient on the New Jersey coast, where it seems to have been more plentiful formerly; occurs in May, and again from the last week of July to September 15. Dr. Warren states that a few have been captured in recent years in Lancaster, Philadelphia and Delaware Counties" (Birds E. Pa. and N. J., 75).

Limosa hæmastica (251). Hudsonian Godwit.

"Much less abundant in the United States than the preceding, and appears to range chiefly along the Atlantic coast" (Birds N. W., 494). "On May 16, '86, I shot a Hudsonian Godwit at

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West River, Md., in a grass field adjoining the village of Halesville" (J. Murray Ellzey, Forrest and Stream, xxvii., 264).

Totanus melanoleucus (254). Greater Yellow-legs.

Common migrant, but not so numerous as the following species. On March 26 ('75, Resler) one was taken at Patapsco Marsh, and on June 7 ('94) one at Ocean City. In fall, Mr. Stone gives them as early as July 15 in New Jersey (Birds E. Pa. and N. J.), and Mr. Richmond at Washington from July 25, but my earliest note is a flock of 35 in Dulaney's Valley on August 12 ('94), while as late as November 4 ('93), I received one from Patapsco Neck (probably shot about the 2nd or 3rd), and another from Cumberland, also probably shot at the same time.

Totanus flavipes (255). Yellow-legs.

More numerous than the former, in the spring from March 15 ('95), at Havre de Grace, to May 17 ('93, Wholey), at Patapsco Marsh, and again from August 12 ('94), at Loch Raven, to September 5 ('93, J. H. Fisher, Jr.), at Spring Gardens. At Washington, September 11 ('94, Wm. Palmer and R. S. Matthews).

Totanus solitarius (256). Solitary Sandpiper.

A regular but not abundant migrant, generally found singly or in pairs in spring, and in small flocks in fall. Noted from April 25 to May 30 ('91, Gray), and from August 13 ('93, Gray) to October 12 ('89, Resler).

This species is a rare summer resident, though its nest has not yet been recorded in Maryland. On July 14, '93, one was in company with a Killdeer in the bed of Gwynn's Falls, at Calverton (Gray and Blogg).

"Occasionally one is seen during the breeding season" at Sandy Springs (Stabler). "In Maryland and Virginia. . . . I have shot birds in August so young as to leave no doubt in my mind that they were bred in the vicinity" (Birds N. W., 499).

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At Washington, D. C., it is recorded as follows: "April 26 ('91) one seen, May 16 ('88) one seen, July 20 ('90) one noted, July 28 ('89), two seen, August 8 (94, Wm. Palmer) one seen, August 11 ('89) one seen, and on August 21 ('94 E. J. Brown), several seen and shot" (Richmond).

"Dr. Treichler, of Lancaster County (Pa.), mentions it as an irregular breeder; he has found young about half grown in the Conowingo meadows early in July" (Birds Pa., 91).

On May 23, '93, I came across one feeding in an ice pond with but little water; I was within 20 feet and watched it through a field glass. It waded with a dainty step, sometimes having perceptibly to pull its feet out of the mud, and once when it got in deeper water swam a few feet with a hurried stroke. Small insects on or in the water, on bottom, on weed stems or on bank it swallowed at once. Tiny tadpoles it worked a second between mandibles and dipped a couple of times in water, apparently to get them head first. One large one it immediately ran ashore with and hammered it on the ground for some little time before swallowing it. In wading it sometimes had the water up to its breast and belly. Generally not more than the bill was immersed, but often the head, occasionally the neck, and once half of the body.

Symphemia semipalmata (258). Willet.

While not as numerous as it used to be, this species is not uncommon on our ocean front, where it still breeds in limited numbers. At Chincoteague Bay, I noted one on June 5 ('94); another on the next day, and three on the 7th at the same place; and Mr. C. W. Dirickson, of Berlin, says: "On their way north in spring a few stop and stay with us all summer. They lay their eggs in very much the same place as the terns, and in fact you can sometimes find both nesting very close together." I am informed that they breed in large numbers on Chincoteague Island, and also on Mockhorn and Smith's Islands, Va. "A few still breed on the New Jersey coast" (Birds E. Pa. and N. J., 76–77).

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On August 19 ('93, Janon Fisher) a number were shot a few miles down the beach from Ocean City. On August 27, '93, a bunch of about 30 were on the flats opposite the Navy Yard, Washington, D. C. (B. A. Bean, Forest and Stream, xli, 230). On November 3, '94, I saw a single bird in the Baltimore market, still quite fresh, which had been shot "down the necks," possibly one or two days before.

Pavoncella pugnax (260). Ruff.

On September 3, '94, a bird of this species was shot at Four Mile Run by Wm. Palmer (Richmond). This European species has occasionally been taken on the coast of New England and the Middle States (for references see Key, 641).

Bartramia longicauda (261). Bartramian Sandpiper.

Common during migrations and fairly represented in summer. In Dulaney's Valley they were first noted on April 21 ('94, Fisher), the migratory birds leaving about the middle of May; they are noted again from August 11 ('95) to September 8 ('95). This year ('95) two pair spent the summer in the north end of the valley, and about a mile apart. These I visited weekly; up to July 14 both birds of each pair would allow of quite close approach, one, presumably the female, often circling round within 50 feet. They gave every sign of nesting, but it was not until early in August that the young were seen flying with the parents. On August 8 two young birds were shot. These birds were flying in two bunches of 4 and 6 until September 1.

On July 3 ('95) one, evidently lost, was flying round calling over an electric light in Baltimore City at 11.30 P. M.

"On July 27 ('89) one was shot at Laurel by Geo. Marshall. First recorded at Washington on April 6 ('92); few stop on their passage, but they are commonly heard while migrating at night" (Richmond). "A summer resident, rare at that season" (A. C., 83).

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Actitis macularia (263). Spotted Sandpiper.

Common summer resident from April 8 ('93, Gray) to Oct. 18 ('94). Numerous all through the state wherever there is water; they regularly spend the summer at Druid Hill Lake, and a few years ago I frequently observed a pair on Jones Falls opposite Union Station, where no doubt they had a nest.

On May 30 ('91, J. H. Fisher, Jr.), a nest was found at Tolchester, containing four nearly hatched eggs, and on July 21 ('95), four young were still being led by the parents.

On July 21 ('95), I watched one for some time; the speed with which it ran after a fly, with sudden doubles, was remarkable; every once in a while it stopped to scratch the back of its head, finally it thought a wash would do that head good, so flying to a shallow part of the run, it squatted down in the water and began to duck its head under, scratching the back of its head on both sides with the nail of the long middle toe, until it got every feather raised and quite wet. The balance of the body received no attention. Hopping on a stone it dried its head by rubbing it against its sides several times and then flew away. This head washing lasted nine minutes.

Numenius longirostris (264). Long-billed Curlew.

Breeding on the Atlantic coast as far north as North Carolina, and casually north to New England, this species is "a straggler on the New Jersey coast, occurring generally in May and September" (Birds E. Pa. and N. J., 78). On May 23 ('93), two were on Hail Point, Kent County. On August 19 ('93, Janon Fisher), quite a number were shot a few miles south of Ocean City, and during September ('93, G. A. Rasch), they were unusually plentiful at Cobb's Island.

Numenius hudsonicus (265). Hudsonian Curlew.

Migratory through the United States. One day in August, 1881, W. H. Fisher shot three about eight miles below Ocean City, Md. On May 19 ('91), he saw a good many at New

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Marsh, Cobb's Island, but they would not decoy, and two days later he saw quite a number at Smith's Island. Given as "common transient along the New Jersey coast, occurring May 1 to June 1, and July 15 to September 15" (Birds E. Pa. and N. J., 78). On May 10 ('95), five and one Curlew flew over Baltimore City, presumably they were of this species.

Numenius borealis (266). Eskimo Curlew.

Migrating through United States. Captain Crumb calls this species a rare and irregular migrant at Cobb's Island (Birds Vas., 57). "Rare transient on the coast, appearing in May and again in September, according to Turnbull" (Birds E. Pa. and N. J., 78).

Family CHARADRIIDÆ—Plovers.

Charadrius squatarola (270). Black-billed Plover.

"Migratory in United States, preferably coastwise, common, but less so than *dominicus*" (Key, 598). Three were noted at Waverly on May 12 ('94, Wholey), and one in Dulaney's Valley the next day. On May 19 ('91, Fisher) three were shot at Cobb's Island, Va., and next day two more from numerous flocks observed. Given as common on the New Jersey coast from April 30 to May 22, and from latter part of July to September 15. Dr. W. L. Abbott has taken specimens on June 3 and November 7 (Birds E. Pa. and N. J., 78–79).

Charadrius dominicus (272). American Golden Plover.

In New Jersey "very erratic transient, rarely seen in spring, but at irregular intervals occurring in large flocks in the fall" (Birds E. Pa. and N. J., 79). At Washington, "rare and irregular migrant" (Richmond); at Cumberland (Shriver).

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Ægialitis vocifera (273). Killdeer.

Common in summer all over the state; this species is very numerous during migrations in tidewater Maryland, where during mild winters more or less may winter. In Dulaney's Valley this species is a common bird from March 10 ('95) to December 2 ('94), while at Powhatan Dam it was noted as early as February 25 ('93, Gray). The set of eggs is, as far as I know, four. Fresh eggs were noted May 28 ('92), one hatched and three pipped, on June 5 ('91), and young still with the parents on July 23 ('93).

On and after July 14 ('95), they are usually to be found in flocks, 53 on one occasion being counted in a close bunch.

Ægialitis semipalmata (274). Semipalmated Plover.

Common migrant appearing on ocean front, sand beaches of Chesapeake Bay and mud flats of our larger inland waters from early in May to the 29 ('80, Resler), when one was taken at Patapsco Marsh. Returning late in July, and remaining until September 22 ('94, Tylor), when five were taken at Ocean City. On August 12 ('94) and 29 ('93, Fisher), they were numerous along Loch Raven.

Ægialitis meloda (277). Piping Plover.

On June 5 ('94), one feeding in the wash of the waves a few miles from Ocean City was noted and three days later, one back where the sand and marsh grass meet, gave unmistakable evidence of having either eggs or small young, but neither could be found.

Given from April 15 to May 15, and in September and October as a transient, a few breeding, and also wintering on the New Jersey coast (Birds E. Pa. and N. J., 79–80). Capt. Crumb states that it has nested at Cobb's Island.

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Ægialitis meloda circumcincta (277*a*). Belted Piping Plover.

This western species is occasional on the Atlantic coast. On May 3, '84, a specimen, now in the National Museum, was obtained on the shore of the Potomac opposite Washington, near the Long Bridge (H. M. Smith and Wm. Palmer, Auk, v, 147).

Ægialitis wilsonia (280). Wilson's Plover.

Common during summer along the Atlantic coast as far north as Virginia. At Cobb's Island, Va., Mr. H. B. Bailey found it a comparatively common bird, May 25–29, '75 (Auk, i, 26), and they were found breeding there on May 20, '91 (Fisher). "Rare straggler on the New Jersey coast, where it probably bred a few years ago" (Birds E. Pa. and N. J., 80).

Family APHRIZIDÆ—Turnstones.

Arenaria interpres (283). Turnstone.

Common migrant on our ocean front during May, August and September. Apparently irregular on the Chesapeake, they have been taken as far up the Potomac as Washington, D. C. "Three Turnstones in the National Museum were taken in the District of Columbia by Mr. C. Drexler in 1860 (?). In June, '82, Mr. J. A. Moore killed a bird at Jones Point, Va., near Washington. In May, '81, Mr. O. N. Bryan secured one, and saw another at Marshall Hall, Md., and we know of the occurrence of three others on the Potomac River within the past three years" (H. M. Smith and Wm. Palmer, Auk, v, 147–148).

Family HÆMATOPODIDÆ—Oystercatchers.

Hæmatopus palliatus (286). American Oystercatcher.

Common on the coast of the Southern States during summer. At Cobb's Island they were found breeding, and eggs were taken during June, '88 (Theo. W. Richards, Oologist, vii, 186),

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and on May 20, '91, several pairs were observed there (Fisher). On June 5, '91, one was noted flying south at North Beach, a few miles south of Ocean City, Md. "Very rare straggler on New Jersey coast" (Birds E. Pa. and N. J., 81).

Order GALLINÆ—Gallinaceous Birds.

Family Tetraonidæ—Grouse, Bob-whites, etc.

Colinus virginianus (289). Bob-white.

Common, resident; May 2 ('93) is the earliest date I have heard the well-known call of "Bob-white," this is generally stopped by the early part of September; it has, however, been heard as late as October 23 ('88, Wholey). Their equally well-known whistle and the faint "click-click" of the covey may be heard at any time. Usually the call is given from the top of the fence, but I have heard it repeatedly given by birds in trees. The nest is seldom found except during harvest when numbers are uncovered. Sets are one each of 8, 12, 14, 18 and 22, and 2 of 10. A nest with eggs was found as late as September 1 ('95). A covey of 7 or 8 holding together rather late was flushed near Magnolia on May 4 ('93, Fisher).

Coturnix communis—European Quail.

In the fall of '79, Messrs. Poultney, Trimble & Co. imported about 200 birds from Italy. These Mr. Charles D. Fisher turned loose on his place at Ruxton, but never saw anything of them afterwards. The following spring about 1000 were imported, and Mr. Kleibacker tells me there were several eggs in the boxes when they arrived. Quite a number were turned out on the "Dundee Shore," where occasionally one or two were seen during the summer, but early in fall they entirely disappeared. Messrs. Charles B. Rogers and Geo. Brown also liberated a number in Green Spring Valley, where at least one pair nested. Mr. Rogers writing me under date of January 27, '93, says: "There were several pairs of the birds on our property. I remember that a nest was found near our blacksmith shop, it was on the ground in a cluster of weeds, and if I remember correctly had 18 eggs in it. Nothing however was ever seen or heard of the Quail after the first winter." Mr. Isaac Slingluff writing in reference to the

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above, says: "The nest was found close to the bank of Shoemaker's Run. I think there were 12 or 13 eggs in it, 4 of which did not hatch." One of these is now in the possession of Mr. Jesse Slingluff.

Mr. E. W. Hasbrouck, of Washington, writes me, "In February, '95, I saw a bunch of European Quail exposed for sale on the street; they were said to have been killed near Opequan Creek, but I could get no further information."

Bonasa umbellus (300). Ruffed Grouse.

Common, resident. On May 2 ('94, Fisher), a nest with 10 fresh eggs was found. During July a covey of young, about as large as partridge, were seen near Ellicott City by Mr. Basil Sollers, and on June 10, '95, at Vale Summit, I came across a pair with 8 or 10 young about the same size.

Tympanuchus americanus (305). Prairie Hen.

Early in the winter of '85 or '86, Col. Edw. Wilkins got 12 or 15 birds from the west and kept them until spring when he turned them loose in his orchard, on the Chester River, about four miles below Chestertown, Kent County; a few days later two or three were seen and then they disappeared. On Eastern Neck Island, Mr. Spencer Wicks shot one in the fall, and Mr. Newton Bogle several times saw another dusting itself in the road in the front of his house. Possibly these were some of Col. Wilkins birds. "Mr. Ridgway records the killing of a Prairie Hen on the Virginia side of the Potomac, near Washington, March 17, '85 (Forest and Stream, xxiv, 204 and 248). It has been suggested that it was a descendant of birds, liberated previously at Snow Hill, Maryland" (Birds Vas., 59).

Family PHASIANIDÆ—Pheasants, etc.

Phasianus colchicus. European Pheasant.

Col. W. F. Mason McCarty tells me that some years ago a number were liberated on the grounds of the Woodmount Gunning Club in Washington County. They are now fairly numerous, and this colony may be considered as established. Occasionally birds wander off, and have been shot quite a distance away from the preserve.

Meleagris gallopavo (310). Wild Turkey.

Mr. Robert Shriver writing from Cumberland, says, "Indigenous here, about as abundant as ever, they seem to be less

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numerous some seasons, owing probably to severity of weather or excessive hunting."

Mr. Wm. H. Fisher supplies the following: "Mr. J. R. Ridgley tells me that on his farm in Howard County, about 10 miles from Ellicott City, some years ago he was listening for squirrels and became conscious of a wild turkey, when too late to secure it." He also says "that now ('93) there are a few near his farm in a tract called Beaver Dam Woods."

Mr. Harden, of Georgetown, shot two in the winter of '81–82, between Georgetown and Tennallytown (A. C., '92).

"While at Weverton on September 26, '93, John Leopold told me that about the first of the month a flock of at least 10 were seen, and that now a flock of seven young, with two adults, is on the other (Virginia) side of the river. Occasionally he has seen turkeys fly across the river, and once one gave out and fell into the water" (Fisher).

Order COLUMBÆ—Pigeons and Doves.

Family Columbidæ—Pigeons and Doves.

Ectopistes migratorius (315). **Passenger Pigeon.**

Originally occurring in large numbers, but only occasionally seen of late years. On August 27, '93, I flushed a pair from a fence in the upper end of Dulaney's Valley and further down a single bird from a tree top. These birds I watched for some time through a field glass, but none of their actions differed from those of doves. Mr. Wm. H. Fisher supplies the following: "For about 10 days, in October '78, flocks of Wild Pigeons flew over our house at Mount Washington between 7 and 7.30 A. M.; 6 to 10 flocks of from 5 to 20 birds each day. In September, '88, I shot one near Bradshaw, and in September, '89, another in Dulaney's Valley; this last was flying with a flock of Doves. Mr. J. R. Ridgley tells me that he saw a flock of 50 or 60 about 8 miles from Ellicott City on September 17, '93. Clarence Cottman says he saw a flock of about 40 pass near the

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head of Lake Roland and fly up Green Spring Valley on September 19, '93."

Dr. Coues, speaking of the District of Columbia, says: "I once killed a specimen so newly from the nest as to cause me to believe that it had been hatched in the vicinity" (Birds N. W., 389).

They were once very common at Cumberland, but of late years have become very rare (Shriver). At Vale Summit I was told that the last flight occurred there on the evening of New Years day '77, when the sky was black with them and large numbers were killed.

Zenaidura macroura (316). Mourning Dove.

Common, resident. The usual set of 2 eggs is recorded from April 1 ('82, Small), at Hagerstown, to August 17 ('93, Stabler) at Sandy Springs; near Baltimore, from April 9 ('93) to August 13 ('90, Resler). The nest is usually placed on a fork, or among twigs on a horizontal branch, where it is flat and shallow, but I found one built in the fork of a split cedar 14 inches from bottom to top. I have also found a number in old nests (Robin, Purple Grackle, Cardinal, etc.), also on fence rails and one on top of a stump. Dr. Warren cites several on the ground (Birds Pa., 114).

During fall they unite into bunches and flocks, these are recorded from August 3 ('95) to April 3 ('93); as a rule they do not range above 25, but I have seen about 50, and Mr. Wm. H. Fisher saw one of at least 200 on August 26, '93.

Columbigallina passerina terrestris (320). Ground Dove.

Common in the Southern States; "its usual range is limited by the Carolinas, but I have a record of the capture of a specimen many years ago at Washington" (A. C., 91. Birds N. W., 390). Another specimen shot by Mr. Thos. Marron on Oct. 14, '88, at Broad Creek, Md., is now in the National Museum (Smith. Report, '89, 117, 358 and 801).

One was taken in Lancaster County, Pa., in '44 (Birds E. Pa. and N. J., 80).

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Order RAPTORES—Birds of Prey.

Family Cathartidæ—American Vultures.

Cathartes aura (325). Turkey Vulture.

Resident, common. 14 sets of 2 eggs are recorded from April 19 ('82, W. L. Amoss, Fallston) to May 30 ('91, Stabler, Sandy Springs). I have several times heard of 3 eggs, but never could verify the statement. The eggs, nest there is none, are placed in hollow prostrate logs, hollow stumps, under rocks, stones, or bushes, and in one case under the worn side of an old straw stack. Given as resident at Hagerstown (Small), but only as casual at Cumberland (Shriver); at Vale Summit I only saw 3 in 10 days (June 5 to 14, '95).

While usually not noticed by other birds, I saw a crow chase one on May 8, '92, and a Fish Hawk chase another on May 30, '93.

Catharista atrata (326). Black Vulture.

"North, regularly to North Carolina, irregularly or casually to Maine, New York, etc." (Manual, 222). "Rarely breeds North of 36°" (Bendire, 165). "On March 30, '95, at Kensington, Md., Mr. J. D. Figgins saw 4 birds which he supposed were of this species. He had never seen the Black Vulture in life, but was familiar with the other large birds known to occur here and from his description of the actions of the birds, I have no doubt they were really of this species" (Richmond).

Family Falconidæ—Falcons, Hawks, Eagles, etc.

Elanoides forficatus (327). Swallow-tailed Kite.

"On the Atlantic coast its natural limits appear to be the lower portions of Virginia, but it has more than once occurred in the Middle States" (Birds N. W., 332). On April 5, '93, I examined a mounted specimen; on inquiry I was told it had been shot by Mr. W. T. Levering, Jr., on Maidens Choice Lane, close to Kenwood Station, near Catonsville, Baltimore County, late in the summer (late July or early August) of '89.

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While in Queen Anne County (May '92) my boatman several times mentioned a "white Hawk with a split tail" which he had observed occasionally, but he could not tell how often or at what time of year. Mr. A. P. Bowen writes me that it is occasionally seen in Prince George's County.

Circus hudsonius (331). Marsh Hawk.

Common resident in tide-water Maryland, this species is common in the uplands from August 4 ('95) to May 2 ('91, Gray), and on June 29 ('92, Gray) one was seen near Powhatan. Mr. L. D. Willis, of Church Creek, Dorchester County, informs me that on a salt marsh of the Blackwater River, about 10 miles south of Cambridge, he found a nest of the Marsh Hawk containing 6 fresh eggs on June 2, '95. Next day the female was shot and an egg ready for extension was found in the oviduct. The nest, a slight affair of dry reeds and grass, was placed on a slight elevation about 60 yards back from the open water and entirely surrounded by thick reeds.

Accipiter velox (332). Sharp-shinned Hawk.

Common resident, but not very numerous in summer. On May 20 ('91, Blogg) a set of 4 eggs was taken, and on May 29 ('92, Fisher) another of 5. At Sandy Springs on May 16, '91, two fresh eggs, and 15 days later a set of 5 (Stabler).

For two years in succession this terror of the poultry yard nested close to our house, but as far as I could learn the chickens were not molested. In '84 the young had left the nest and were being fed round the house on June 8, 15 and 22. In '85 I spent May 31 and June 7 watching the young being fed. They were in a natural cavity of a chestnut tree in full view of the house and not 100 feet away from it. The entrance was a small rotted-out branch hole about 4 inches in diameter and about 40 feet from the ground. By means of a field glass I saw that the young were being fed on grasshoppers. On the approach of a parent they made a great noise, and as this could

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easily he heard all over the house, the feeding was continuous from "the dawn's early light," until it was too dark to see the birds come and go. The nest of this species is usually placed in the twigs of a cedar or pine.

Accipiter cooperi (333). Cooper's Hawk.

Resident, but at all times less numerous than *velox*. The nest is built early in April, and the birds stay around it a long time before the eggs are laid. On April 29 ('91, Stabler) a set of eggs was taken at Sandy Springs, and on June 20 ('88, Resler), two birds, at most a week old, were in a nest in Howard County. Sets are 1 of 2, 2 of 3 and 2 of 5.

Accipiter atricapillus (334). American Goshawk.

Maryland appears to be the southern limit of this species in winter, but it is not taken here often. In '68, Dr. J. Lee McComas, of Cumberland, sent two, shot in Maryland, to the Smithsonian (Smith. Report, '68, 57), and another sent to Dr. A. K. Fisher, was taken in a steel trap by Mr. Leizear, of Sandy Springs, on December 27 ('87, Stabler).

Buteo borealis (337). Red-tailed Hawk.

Resident, common, but not often seen in summer. Two slightly incubated eggs were taken on March 25 ('94, Hoen), and three birds just hatched were seen on May 7 ('93), while two birds apparently just out of the nest were trying to follow their parents on July 5 ('94). Sets are 1 of 1; 5 of 2; 2 of 3 and 1 of 4. Outside the breeding season they are more or less gregarious, at times being seen in quite large flocks.

Buteo lineatus (399). Red-shouldered Hawk.

Inside the limits of Baltimore City this is the most numerous hawk at any time of the year, but in Baltimore County *borealis* far outnumbers it. On March 20 ('93) two sets of fresh eggs

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were taken (a ring of snow was round each nest, and it was two feet deep on the ground); while on May 6 ('94, Wholey) a set nearly incubated was collected, and on May 31 ('91) a second set was taken. Sets are 5 of 2; 4 of 3, and 4 of 4.

Outside the breeding season, this species, like *borealis* may sometimes be seen in flocks, more often in bunches of 3 or 4 to 10, but generally singly or in pairs.

Buteo latissimus (343). **Broad-winged Hawk.**

Resident, but not common. On April 27 ('91) a set of three eggs was taken; on May 19 ('92, Blogg) a set of two, and on May 23 ('92, J. H. Fisher, Jr.) a set of three nearly incubated. At Sandy Springs, a set of three was taken April 9 ('91); one of three in May ('92); one of two on May 15 ('92), and another of two on May 22 ('92, Stabler).

The three *Buteos* are the hawks usually shot by our farmers, because they are large, fly slow, and are called "hen-hawks," while the much smaller, swift flying, *Falcos* and *Accipiters*, that may at times take chickens, escape.

Archibuteo lagopus sancti-johannis (347*a*). **American Rough-legged Hawk.**

"Along the Delaware, below Philadelphia, it is still found in considerable numbers from November to the end of March" (Birds E. Pa. and N. J., 87). It does not appear to be numerous in Maryland. On January 24, '92, in Dulaney's Valley, one sitting on a tree allowed me to drive slowly past within twenty feet of it. Dr. M. G. Ellzey says this species was very numerous in Howard County during the winter and spring of '87–88 (Forest and Stream, xxxii, 212). At Sandy Springs one was shot by Mr. Leizear on March 17, '88 (Stabler). One was seen on the Virginia side of the Potomac, opposite Washington, on December 29, '79, by Mr. H. W. Henshaw (A. C., 88–9), and it has been taken in the District of Columbia (L. M. McCormick, Auk, i, 397).

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Aquila chrysaëtos (349). Golden Eagle.

An irregular winter visitant. On June 30, '83, a mounted specimen was presented to the Maryland Academy of Sciences, by Dr. Murdoch; it was shot at Back River, and had five toes instead of four. On November 28, '94, one was shot at Otter Creek, Harford County; this specimen I had mounted. Four were secured in Maryland, near Washington (see Smith. Reports, '62, 58; '69, 55; '75, 73; '91, 793). On December 8, '87, one was shot at Gaithersburg (Fisher's Hawks and Owls, 97). One in the First National Bank of Cumberland was shot by Mr. Robert Shriver about 30 years ago. "Until about 1856, for many years a pair is said to have nested in the southern part of Lancaster County on a lofty jutting cliff over the Susquehanna River" (M. W. Raub, Auk, ix, 200).

Haliæetus leucocephalus (352). Bald Eagle.

Resident, and generally dispersed along the shores of the Chesapeake Bay and other larger waters of Maryland, being fairly common. At Loch Raven it is no unusual sight to see one or more, and Dr. Wilson, of Glenarm, tells me that about 40 years ago there was a nest used year after year within half a mile of his house. I have only found the nest "down the necks" and on the Eastern Shore; but they breed all along the Potomac as far up as Hancock. On March 8 ('94) three eggs nearly fresh were taken; on March 27 ('95), two nearly fresh; on March 29 ('93), two about two-thirds incubated; on April 15 ('93), two birds, five or six weeks old, and on June 2 ('92), two birds about ready to leave the nest. On February 26 ('93), two eggs were collected at Mount Vernon by E. M. Hasbrouck. The nest being used for years, sometimes attains considerable size, eight feet across the top and seven feet high, is the largest one I have measured.

In confinement at Toledo, Ohio, two eggs were laid, incubation commenced on March 26, '86, and one bird was hatched on April 26; on March 18, '88, she again started to incubate

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two eggs; one bird was hatched on April 22, and another the next day (Henry Hulce, Forest and Stream, xxvi, 327 and xxx, 289).

Falco peregrinus anatum (356). Duck Hawk.

"Universally, but irregularly distributed in North America, scarcely to be considered common anywhere, breeds as far south as Virginia at least, usually in mountainous regions" (Key, 536). "Nests sparingly from 35° north" (Bendire, 292). On March 5 ('87, Fisher), one was seen at Grace's Quarter, but it kept out of range. On December 10, '94, one was brought alive to Baltimore by a countryman, and lived for about four months in the window of No. 208 E. Baltimore street.

"Mr. W. T. Roberts got a female on November 16, '79, at Potomac Landing, near Washington" (Richmond). "Mr. Jouy states that the Duck Hawk has been known to breed at Harper's Ferry" (A. C., 87). In reference to this, Mr. W. H. Fisher had a conversation with a resident of Harper's Ferry on October 10, '93. He was not acquainted with the "Duck Hawk," but stated that the "Rock Hawk" nested on the face of the Maryland Heights, and that the site of the nest could be easily located by the "white-wash" after the young were hatched.

This species is reported as regularly breeding along the Susquehanna in Lancaster and York Counties, Pa. In the latter county a set of four slightly incubated eggs was taken on April 7, '80, by Mr. Geo. Miller (Birds Pa., 137).

Falco columbarius (357). Pigeon Hawk.

"Whole of North America, breeding chiefly north of the United States" (Manual, 250). "Doubtless breeds in the mountainous portions of some of the Southern States" (Bendire, 299).

I have but few notes on this powerful little hawk. On April 19, '92, one was shot at Washington, that had been feeding on a Sparrow-hawk (Fisher's Hawks and Owls, 113). On April 26, '93, one was shot near Bay View by A. Wolle,

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it had been feeding on a Snow-bird. On April 30, '93, in Dulaney's Valley two birds swished close past me making for a small scrubby thorn bush, round which they went several times; finally one darted into its centre, the other kept round once more and lit on top. I then saw that they were a Catbird and a Pigeon Hawk, the hawk seeing me flew, but the Catbird remained apparently thoroughly exhausted. On October 30, '92, I surprised one feeding on a dove. A not uncommon migrant at Washington (Richmond). "Mr. F. L. Washburn, of Johns Hopkins University, has reported to the Agricultural Department that he observed several pairs, apparently breeding at Harper's Ferry, April 12, '87" (Birds Vas., 62).

Falco sparverius (360). **American Sparrow Hawk.**

Resident, common, but most numerous during the migrations of small bird. Hence, on March 18 ('93, Wholey and Gray) about 75 were seen in Dulaney's Valley. During summer they are not often seen except in the locality of the nest. Dates for eggs range from April 17 ('95, Henninghouse) to May 28 ('93), and a second set was taken June 24 ('94). On August 4 ('95) flying young were still being fed by the parents. Sets are 9 of 4 and 6 of 5.

Pandion haliaëtus carolinensis (364). **American Osprey.**

Common summer resident on all our larger waters, extremely numerous on the arms of the Chesapeake. On March 11 ('93, Blogg) five were seen at Fulton Avenue. On the Eastern Shore it is maintained that they always arrive on St. Patrick's Day, March 17. Dr. Sharp's attention was called to this, and he reported that the first bird arrived at Rock Hall on March 14, '95. Late in September most have gone south, but they have been noted later, the last on November 8 ('92, Blogg).

On April 3 ('93) they were patching up old nests at the mouth of Gunpowder, and on April 24 ('94, Tylor) sets of fresh eggs were collected in Talbot County, where on August

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19 ('83) I noted a number of nests with young still in them. Sets are 4 of 1, 9 of 2, 19 of 3, and 3 of 4.

Inland, this bird is seen more or less regularly at Loch Raven, and one was seen as far up the Gunpowder as Cockeysville on April 17, '94 (Fisher). Several were over the Potomac, at Brunswick, on September 26, '93 (Fisher).

Family STRIGIDÆ—Barn Owls.

Strix pratincola (365). American Barn Owl.

"Not abundant north of the Carolinas" (Birds N. W., 300). "At Washington, where the Barn Owl is by no means rare, they begin nesting from the last week in April to about May 10" (Bendire, 327). "The National Museum collection contains two eggs of this bird taken from the Smithsonian towers, one in June, '61, the other June 1, '65" (C. W. Richmond, Auk, v, 20). On June 28, '90, seven half-grown young were found in this tower (Fisher's Hawks and Owls, 136). "On December 8, '93, a young bird that had but recently left its nest was caught, probably hatched some time in October. On February 27, '95, another of about the same age was picked up in a bush in the Smithsonian grounds. This was certainly not over two months old, and must have been hatched in the latter part of December, if not early in January; certainly a most unusual time of the year for this owl to breed in this latitude" (C. E. Bendire, Auk, xii, 180–81).

Occasionally one is secured anywhere in tidewater Maryland, and they seemed to be more numerous than usual during the spring of '93. On April 6 one was shot at the Old Marine Hospital; on the 20th, a male at Aberdeen, Harford County; on the 22nd, another male on Patapsco Neck, and on July 27th a female and five downy young were taken alive near the Old Marine Hospital, by A. Wolle.

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Family BUBONIDÆ—Horned Owls, Hoot Owls, etc.

Asio wilsonianus (366). American Long-eared Owl.

Nocturnal in its habits; this species is resident, but as far as I know not common, though a locality may yet be found where it is numerous. On April 22 ('93, Gray and Blogg), a set of six eggs, nearly hatched, was collected near Randalstown, from an old crow's nest about 20 feet up a small pine.

"Common resident at Washington" (Richmond); "at Hagerstown one was shot in January" ('79 Small).

Asio accipitrinus (367). Short-eared Owl.

"It is more than likely that it breeds, occasionally at least, in suitable localities along the borders of the extensive marshes of the sea coast of the southern Atlantic States; by far the greater number, however, breed north of the United States" (Bendire, 332). "Decidedly the commonest owl about Washington, especially in winter" (Birds N. W., 307), where it has been taken in November, January, March and April, and at Sandy Springs it has been taken in December, January, February and March (Fisher's Hawks and Owls, 148–9). On April 1 ('92, Fisher) one was taken at Ruxton. On October 22 ('92, Gray), one at Pikesville; on November 8 ('90, Pleasants), one at Towson, and on December 2 ('93, R. C. Watters), one in Dorchester County.

Syrnium nebulosum (368). Barred Owl.

Resident, numerous "down the necks," otherwise fairly common round Baltimore. March 16 ('95, Fisher), one fresh egg, and May 5 ('94, Fisher), two young birds, four or five days old, are extreme nesting dates. Sets are 2 of 1, 4 of 2, and 1 of 3.

Nyctala acadica (372). Saw-whet Owl.

While by no means common in winter, a number have been recorded. On November 13 ('92, Blogg) one flew into a brightly lighted room in the city. On December 23 ('75,

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Resler) one was taken alive, and on March 4 ('94, Tyler and Fisher) another was taken alive at Bird River. The records of the Maryland Academy of Sciences show one presented on May 15 ('79), possibly a mounted specimen.

Quite a number are recorded from the District of Columbia and adjoining portions of Maryland. F. W. Webster notes eight obtained early in October in different years (Auk, iv, 161). One taken on November 1 ('78); one on February 12 ('59), and one on March 12 ('89) (C. W. Richmond, Auk, vi, 189). One on December 12 ('90); three on January 4 ('91), and one taken alive in the Smithsonian on February 4 or 5 ('91) (E. M. Hasbrouck, Auk, viii, 313); one on November 1 ('89) (Fisher's Hawks and Owls, 162), and another at Ivy City, on December 3 ('89) (W. A. Merritt, Oologist, viii, 313).

Megascops asio (373). Screech Owl.

Common resident and generally dispersed, but more often heard than seen. I have heard them all through winter at Waverly, Baltimore City, where on January 16, '92, at 7.30 P. M. one was "laughing" as merrily as in June, though there was 6 inches of snow on the ground. Nesting dates range from April 4 ('92), 4 fresh eggs, to June 4 ('93), 3 birds just hatched, while on July 24 ('93) young nearly grown were still being fed by the parents. Sets are 2 of 2, 5 of 3, 9 of 4, and 3 of 5. As far as I know the gray and red phases of plumage are about equal round Baltimore.

Bubo virginianus (375). Great Horned Owl.

Common resident, but most numerous in heavily wooded sections of the state, especially in tidewater Maryland. On February 11 (94, Tylor) two fresh eggs were taken on the Virginia side of the Potomac, near Alexandria. On February 25 ('95, Tylor), two eggs, one-third inculated, at Magnolia. On April 2 ('93), one bird about 2 weeks old at Bush River, and on April 12 ('93, A. Wolle), 2 eggs "down the necks."

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'In Dulaney's Valley on March 10 ('95) a nest was found with an egg about to hatch and a young bird not 24 hours old, and on April 24 ('92) two young birds just out of the nest were captured alive.

Sets are 1 of 1, 8 of 2, 1 of 3, and early in April '91 four birds just out of the nest and sitting together on a limb were seen in Talbot County, two of these were captured and raised in confinement (Tylor).

Nyctea nyctea (376). Snowy Owl.

More or less numerous in Maryland during severe winters, this species cannot at any time be called common. Quite a number are on record from all over the state, but I cannot get exact dates.

Order PSITTACI—PARROTS, ETC.

Family PSITTACIDÆ—Parrots and Paroquets.

Conurus carolinensis (382). Carolina Paroquet.

Originally well known in tidewater Maryland, the only occurrence for many years is recorded as follows: "In September, '65, while gunning for Sora on the Potomac River, Mr. Ed. Derrick fired into a flock of strange birds flying overhead, killing several which proved to be Carolina Paroquets. He had one mounted and kept the specimen in his house for a number of years. Other parties on the marsh at the same time shot numbers of the birds" (H. M. Smith, and Wm. Palmer, Auk, v, 148).

Order COCCYGES—CUCKOOS, KINGFISHERS, ETC.

Family CUCULIDÆ—Cuckoos, etc.

Coccyzus americanus (387). Yellow-billed Cuckoo.

Common summer resident, but more often heard than seen. Extreme dates are April 28 ('88, Resler) and October 14 ('91, Resler). Nests with eggs have been found from June 7 ('93,

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Fisher) to August 23 ('91). As far as I have been definitely able to note sets, they are 6 of 2, 3 of 3, and 2 of 4. I have found nests with all the eggs in the same state of incubation and others with various stages, from large young birds to eggs in different stages of incubation. At Vale Summit they were fairly common, on June 9 ('95) a nest contained 2 fresh eggs.

Coccyzus erythrophthalmus (388). Black-billed Cuckoo.

A common migrant and rare summer resident. May 8 ('89, Resler) and May 21 ('93, Wholey) seem extremes of the spring movement, and August 4 ('95) to October 3 ('93, Wholey) cover the fall. On September 28 '92, (Wholey) "they were the most numerous birds seen in the woods."

On July 7, '93, (Gray) a nest with one young bird and 3 nearly incubated eggs was found at Calverton, while further out the Franklin Road, in an overgrown corner, two broods were raised the same year.

At Washington it is noted as "rare from May 2 to the middle of October" (Richmond). At Hagerstown, noted in July, August and September ('80), and from May 11 to September ('81, Small). At Vale Summit, on June 14, '95, I found the nest, containing 2 eggs about one-half incubated, of the only pair there.

Family ALCEDINIDÆ—Kingfishers.

Ceryle alcyon (390). Belted Kingfisher.

Abundant during spring, summer and fall; a number winter in tidewater Maryland during mild seasons, only leaving when frozen out. The nest tunnel, in a bank, preferably but not always over water, is remarkably close to 4 inches in diameter and usually about 5 feet long, though I have seen two of not quite 2 feet and one of over 10. As a rule they go straight in but occasionally they make a bend. The nesting hole at the end is rounded in the shape of a flattened sphere and averages 16 inches across by 8 inches high. In this, the first egg is laid on the bare ground, but by the time the eggs hatch about a quart

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of loose fish scales and bones have accumulated. May 9 ('92, Blogg), 5 fresh eggs, and May 31 ('92), one fresh egg, are extreme dates; full sets are 3 of 6, and 6 of 7.

Order PICI—Woodpeckers, etc.

Family Picidæ—Woodpeckers.

Campephilus principalis (392). Ivory-billed Woodpecker.

However the distribution of this species may have been, it is now very restricted. Audubon says (iv, 124): "On the Atlantic coast North Carolina may be taken as the limit of its distribution, although now and then an individual of this species may be occasionally seen in Maryland."

Dryobates villosus (393). Hairy Woodpecker.

Resident, but not common, and, as it is usually found in heavy timber, appears much rarer than it really is. On June 2 ('94, Fisher) a very noisy pair evidently had a nest, but it was not found owing to lack of time. Young of the year were noted on July 10 ('92) and on August 20 ('93). On May 8 ('95, H. C. Oberholzer) a pair were feeding young near the Great Falls of the Potomac, on the Maryland side.

Dryobates pubescens (394). Downy Woodpecker.

Common resident. Nests with eggs have been noted from May 4 ('91) to May 22 ('93); the set being 5. On June 8 ('84) young were nearly ready to leave the nest, and on July 4 ('93) young not long out of the nest were seen.

Dryobates borealis (395). Red-cockaded Woodpecker.

"Pine swamps and barrens of South Atlantic and Gulf States, north to Pennsylvania" (Key, 481); "irregularly north to New Jersey" (Manual, 283). Dr. Ezra Meichner in his Catalogue of Chester County Birds, published in 1863, writes, "accidental, very rare" (Birds Pa., 167).

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Sphyrapicus varius (402). **Yellow-bellied Sapsucker.**

Common during migrations, September 27 ('79, Resler) to October 26 ('94), and again from March 12 ('92, Gray) to May 2 ('93, Fisher). No doubt this species winters in southern Maryland, as specimens have been taken near Baltimore on November 8 ('84, Resler); November 12 ('92, Gray); November 26 ('93); December 6 ('93, J. H. Fisher, Jr.); December 24 ('92, Blogg), and January 1 ('92, Resler).

At Washington, "J. D. Figgens got one on January 14, '88; one was shot February 15, about '59, and one was seen about the middle of January, '94" (Richmond).

At Hagerstown they were noted during January and December, '79; January, February, March, October, November and December, '80, and from January right along to July, and also in October, '81 (Small). On July 6, '95, (Tylor) adults feeding young were noted at Deer Park.

Ceophlœus pileatus (405). **Pileated Woodpecker.**

Fairly common in the heavily wooded parts of Maryland. Early in June '95 a nest was found by Mr. L. D. Willis near Church Creek, Dorchester County. It contained 3 eggs; 2 nearly hatched, the other rotten. It measured 2 feet 2 inches deep by 8 inches in diameter, the entrance was 5½ inches across and 20 feet from the ground, in a rotten stub. November 17 to 22, '94 (Fisher), quite a number were seen in Somerset County, and one was observed to enter a hole in a stub.

"Mr. Palmer has 3 specimens bought in market (Washington) on the 9th of January, '79, which had been shot in Maryland, near the District line" (A. C., 81–2). "Said to be not rare at Johnson's Gully, Maryland, near Marshall Hall, and about 14 miles from Washington. Must be quite common in Virginia, as a market gunner brought me nine at one time. He would not disclose the locality, but said it was in Virginia" (Richmond). Quite a number are exposed for sale in our Baltimore markets each winter, but they are all said to come

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from Pennsylvania. On November 7, '91, I saw one that had been shot in Carroll County.

"The Indian hen used to be common round Cumberland, but is now very rare" (Z. Laney).

Melanerpes erythrocephalus (406). Red-headed Woodpecker.

This very erratic species, common one year in a certain locality and the next entirely absent or only in limited numbers, is resident, migratory or anything else, apparently at its own sweet will. During the severe winter of '92–3 Mr. W. N. Wholey and I had 8 or 10 birds that we went out regularly to see. They were resident in localities about one-half mile apart and stayed all winter; one was very noisy, the others were silent. The following winter none remained. May 3 ('91) and June 19 ('92) are extremes for eggs. Sets are 3 of 5, 1 of 4, and 1 of 3. As a rule they dig their own holes, telegraph poles being often used, but on May 3, '91, I found three fresh eggs in a hollow log leaning against a fence. The entrance was 15 inches from top to bottom and 4 inches across, while the cavity only went down 6 inches.

At Washington "not very common and local. It usually spends the winter in smaller numbers, or else keeps more secluded" (Richmond).

Melanerpes carolinus (409). Red-bellied Woodpecker.

This southern species is not common around Baltimore. Occasionally noted from August 3 ('87, Resler) to May 16 (91, Blogg). "Rather common near Laurel, where it is a permanent resident" (Richmond). At Washington it is given as "a permanent resident, rare" (A. C., 83); "very rare, Mr. Henshaw saw an individual about the last of May, '87" (C. W. Richmond, Auk, v, 21). In Queen Anne's County they were quite numerous on March 4 and 5, '93, though there was 12 inches of snow on the ground, and the thermometer went down to 8° during the intervening night.

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At Princess Anne, Somerset County, they were rather common from November 13 to 22 ('94, Fisher), and Mr. E. G. Polk writing from there, says: "They stay here all summer, at least until after cherries are ripe, as I have shot a number out of the trees, where they were stealing cherries."

Colaptes auratus (412). Flicker.

Common migrant, more numerous during migrations. April 28 ('94, Tylor), in Talbot County, and May 12 ('95), near Baltimore, to June 23 ('93), are extremes for eggs. Sets are 1 of 2, 3 of 5, 4 of 6, 2 of 7, 3 of 8, 1 of 9, 1 of 10, and 1 of 11. Flickers usually dig their own holes, but they will nest in natural cavities and various other places; if undisturbed, using the same site for years.

Order MACROCHIRES—Goatsuckers, Swifts, Hummingbirds, etc.

Family Caprimulgidæ—Nighthawks, Whip-poor-wills, etc.

Antrostomus carolinensis (416). Chuck-will's-widow.

North, regularly in summer to North Carolina; in a letter to Wm. H. Fisher, Capt. Crumb says he has taken this species at Cobb's Island, Va.

At Odenton, Anne Arundel County, upon two occasions in July, Prof. P. R. Uhler has observed single birds of this species, their size making them quite conspicuous among the Whip-poor-wills which were quite numerous there.

Antrostomus vociferus (417). Whip-poor-will.

Locally common during summer, it was first heard April 9 ('93, Wholey), and on April 27 ('93, Fisher) they were common, remaining so until September 20 ('91), the last being noted September 28 ('94). At Washington, "to October" (Richmond).

On May 5 ('94, Tylor) one fresh egg was found, and on June 10 ('91, Fisher) one young bird a few days old.

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Chordeiles virginianus (420). Nighthawk.

About equally numerous and just as local as the Whip-poor-will, from April 29 ('93, J. H. Fisher, Jr.) to October 15 ('92, Blogg). At Washington, April 20 (Richmond). In fall, large flocks migrating are noted from August 29 ('94) to September 25 ('92, Wholey). Nesting on the bare ground, this species has discovered an excellent substitute in the flat roofs of the houses of Baltimore City, where a large number breed. On June 8, '91, one young bird a few days old was seen within stone's throw of the City Hall, and on July 31, '94, two young birds were flying after their parents.

Family MICROPODIDÆ—Swifts.

Chætura pelagica (423). Chimney Swift.

Common summer resident from April 16 ('91) to October 4 ('93); extreme dates are March 30 ('95, Blogg) and October 17 ('88, Resler); at Hagerstown, April 6 to October 16 ('80, Small); at Cumberland, April 5 ('95, Z. Laney).

On May 15 ('92) a pair were seen mating, but they were not noticed breaking twigs until June 3 ('94); eggs were in nests on June 19 ('81), and young birds fell down the chimney on August 27 ('93). Sets are 2 of 5.

Family TROCHILIDÆ—Hummingbirds.

Trochilus colubris (428). Ruby-throated Hummingbird.

Common summer resident; first noted at Washington on April 28 (Richmond) and numerous around Baltimore from May 1 ('92, Resler) to September 25 ('92); the latest date is October 3 ('88, Resler), when one was perched on a telegraph wire in the city, and ('90, Wholey) when one was taken. The usual set of two eggs is noted from June 2 ('93, J. H. Fisher, Jr.) to July 10 ('92, Blogg).

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Order PASSERES—Perchingbirds.

Family Tyrannidæ—Flycatchers.

Milvulus forficatus (443). Scissor-tailed Flycatcher.

"A *Milvulus* probably *M. forficatus* is given in the original edition as having been obtained by Mr. C. Drexler, on May 6, '81. We have never been satisfied of the accuracy of the information, even supposing veracity on the part of our informant, and in our remarks on Mr. Jouy's list, we spoke as if inclined to drop the species from the list; but we have no more authority for doing so than for retaining it, so we make no alteration in a record which, unfortunately, must always remain dubious" (A. C., 75–6). One "was sent to the Smithsonian Institute by Mr. R. B. Taylor, of Norfolk, Va., . . . shot on January 2, '82 in his door yard in that city" (Robert Ridgway, Auk, viii, 59). Under date of May 5, '93, Capt. Crumb states that he has secured a specimen at Cobb's Island.

Tyrannus tyrannus (444). Kingbird.

Common summer resident from April 14 ('95), to September 15 (93, Gray). On September 23, '91, I saw a single bird 2 miles north of Martinsburg, W. Va., and at Hagerstown they are noted from April 13 ('83) to October ('79, Small). During migrations they appear in flocks, sometimes over 100 being together, these have been noted from April 30 ('93) to May 3 ('93, Fisher), and from August 4 ('95) to September 7 ('94). Extreme dates for eggs are May 31 ('93) and July 17 ('92). On August 12 ('94), young were still being fed. Sets are 1 of 1, 1 of 2, 13 of 3, and 3 of 4.

Tyrannus verticalis (447). Arkansas Kingbird.

"This is a western species added to the list in '77, by Mr. Jouy, who found it in the flesh in market September 30, '74. In point of fact, it was not actually got in the District, but in some adjoining portion of Maryland. There is no doubt about

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the bird, as the specimen is preserved in the United States National Museum. (Smith. Report, '74–5, 32. Jouy's Catalogue, '77, 5 and 11)" (A. C., '76).

Myiarchus crinitus (452). Crested Flycatcher.

Common summer resident from April 29 ('93, Gray), to September 2 ('93, Gray); extreme dates are April 27 ('93, Gray), and September 21 ('94). Eggs are recorded from June 6 ('91), to July 9 ('93). Sets are 1 of 3, 1 of 4, 4 of 5, and 2 of 6.

Sayornis phœbe (456). Phœbe.

Common from March 18 ('94) to October 17 ('94), quite a number of single birds have been observed during the remainder of the year. This year ('95), however, they have been absent; a few were observed between March 31 and May 13, after which none were seen until September 15.

Extreme nesting dates are April 8 ('94), a nest ready for eggs and July 8 ('94), eggs nearly hatched. Sets are 3 of 3, 10 of 4, 13 of 5, and 1 of 6.

At Hagerstown, under date of January 26, '82, Small says: "Has probably been with us all winter, was seen December 8 and 26, and January 18, 19, 20 and 21."

Contopus borealis (459). Olive-sided Flycatcher.

Rare migrant. "The claim of this species to a place in our list (of the District of Columbia) rests upon Mr. Ridgway's observation near Fall's Church, Va., where several birds were noticed in September, '81. Further west in Virginia, the species cannot be considered very rare, individuals having been observed for 3 or 4 successive summers by one of the authors, and Dr. A. K. Fisher has taken a specimen in the Bull Run mountains" (H. M. Smith and Wm. Palmer, Auk, v, 148).

"Judge Libhart states that this species (probably 15 or 20 years ago) was found as a breeder in Lancaster County, where, however, in recent years it has been observed by Dr. Treichler only as a rare spring and fall migrant" (Birds Pa., 194).

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Contopus virens (461). Wood Pewee.

Common summer resident; first noted on April 25 ('85, Resler), when one was taken, and numerous on May 8 ('94). A number were noted October 15 ('93), and two days later ('83, Resler) one was taken. Nesting dates range from June 8 ('92, Blogg), a set of fresh eggs to September 12 ('92, Wholey) young birds not able to fly far. Sets are 1 of 1, 5 of 2, and 7 of 3.

Empidonax flaviventris (463). Yellow-bellied Flycatcher.

Migrant, not common. Spring notes are few. On May 14 ('93), a male was taken and 4 days later another, 3 days after which 5 were seen (Wholey). On May 16 ('83), and 19 ('93), single birds were taken (Resler). During fall they are frequently recorded between August 31 ('93, Gray) and October 6 ('94).

At Washington, a "spring and fall migrant arrives first week in May and we have seen it in the fall until the third week in September. One shot July 28," (A. C., 78) "migrant during whole of May, and August and September" (Richmond). "Tolerably common migrant near Washington, generally in the scrub pines" (Dr. A. K. Fisher, Birds Vas., 67). This last observation may account for its not being more frequently noted near Baltimore, as but a small percentage of our local observations have been made among the pines.

Empidonax virescens (465). Acadian Flycatcher.

First noted on April 30 ('93, Wholey), and common from May 11 ('94,) to August 24 ('94 and '95,) the last was recorded on September 11 ('94). On May 31 ('91,) a nest was ready for eggs and on July 30 ('93, Fisher), one contained eggs ready to hatch. Sets are 28 of 3, and 1 of 4.

Empidonax traillii alnorum (622*a*). Traill's Flycatcher.

Rare migrant. On May 5, '93 (Resler), one was taken at Back River, and on May 11, '93, (Wholey) another at Waverly. "One

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was taken by the writer on May 13, '88, at the Potomac River, Alexander County, Va.; another by Mr. Ridgway on May 18, '88, at Laurel, Maryland, and a third by myself on May 19, '88, in Virginia, opposite Georgetown. Several others were subsequently seen and observed" (Wm. Palmer, Auk, vi, 71), "This has always been regarded as the rarest of the flycatcher's; very few having been taken up to the present year ('92). On and about May 18 for several days they were quite common and a number were taken" (E. M. Hasbrouck, Auk, x, '93). "Common at times, I saw several on May 23, '91. Wm. Palmer shot one on May 10, '94, and another on August 27, '89, and I shot one on September 17, '90" (Richmond).

Empidonax minimus (467). **Least Flycatcher.**

Rare migrant, specimens have been taken on April 29 ('93, Gray), on April 30 and May 7 ('92, Pleasants), on September 11 and 25 ('93, Gray), and September 28 ('92, Resler). At Washington, "common from April 25 to May 25 and from August 28 to September 25" (Richmond).

On Dan's mountain, June 5 to 14, '95, three or four pairs were mating in a grove of heavy timber.

Family ALAUDIDÆ—Larks.

Otocoris alpestris (474). **Horned Lark.**

Irregularly abundant in flocks, which are sometimes quite large, from November 10 ('94, Gray), to March 19 ('92, Gray); they are most numerous in tidewater Maryland. At Washington, from the first of November to April (A. C., 41).

Otocoris alpestris praticola (474*b*). **Prairie Horned Lark.**

This sub-species appearing in company with *alpestris* can only be identified by close comparison with a series of specimens. One, of several shot at Powhatan, on February 25 ('93, Gray), was pronounced of this sub-species by Mr. Ridgway.

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"Two in the collection of Wm. Palmer have been identified by Mr. Henshaw as belonging to this race; they were taken in February, '81, and were in company with numbers of *Otocoris alpestris*. On February 16, '88, eighteen specimens of this variety were taken by Wm. Palmer, near Washington, from a flock of 50 or 60 birds that had been noted in the vicinity throughout the winter. About half a dozen other specimens have recently been obtained by various collectors" (H. M. Smith and Wm. Palmer, Auk, v, 148).

Family CORVIDÆ—Crows, Jays, etc.

Cyanocitta cristata (477). Blue Jay.

Common resident. A pair were mating on April 13 ('93), and eggs were collected, 5 on May 13 ('82) and 4 on May 30 ('94, Tylor).

Corvus corax principalis (486). Raven.

Now rare in Maryland, but, without doubt, may be credited to our ocean front and also to the mountains of Western Maryland. During Christmas week '92, about 20 were seen at Bayard, W. Va., but they could not be approached within rifle range. On December 6, '93, several were seen at the same place (J. H. Fisher, Jr.). Bayard is within 5 miles of the Potomac. During July, '80, Ravens were found on Cobbs, Boone and Mockhorn Islands (Robert Ridgway, Auk, vi, 118). Recorded from Franklin, Somerset and York Counties, Pa., (Birds Pa., 202). One was taken at Hagerstown in October, '80 (Small).

Corvus americanus (488). American Crow.

An abundant resident; scattered over the country in summer, and gathering into large "roosts" in winter. They had started roosting on October 21 ('94), and were using it in numbers from November 4 ('94) to March 24 ('95), but I only saw a few on March 31. A nest with 3 fresh eggs on March 13 ('88,

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Wholey), and another with 1 fresh egg on May 13 ('82), are extreme dates. Young were still in a nest on June 5 ('92) and a family was still holding together on August 13 ('93). Sets are 3 of 2, 3 of 3, 18 of 4, 22 of 5, 1 of 7, and 1 of 10. On Dan's Mountain I only saw 5 or 6 crows from June 5 to 14 ('95).

Corvus ossifragus (490). Fish Crow.

Resident in tidewater Maryland. Five eggs nearly incubated were taken at Gunpowder on May 21 ('93, Fisher), 5 in the same condition on May 26 ('92), and a fresh egg, 5 days later, were collected in Queen Anne County. On June 8 ('94), 5 eggs, about to hatch, also 1 fresh egg were, noted at Ocean City. This last nest was only 8 feet from the ground in an alder bush (*Alnus maritima*), the others were all in the tops of high trees.

Family ICTERIDÆ—Blackbirds, Orioles, etc.

Dolichonyx oryzivorus (494). Bobolink.

Common migrant from April 28 ('95) to May 26 ('95), and from August 9 ('94) to November 8 ('88, Resler). Usually observed in the uplands in spring, they are also numerous there in the fall, while the marshes are alive with them. In April, '95, seven were shot from a flock at Cumberland by Z. Laney.

Molothrus ater (495). Cowbird.

Resident; wintering in tidewater Maryland, they are seldom seen in the uplands until spring (March 12, '92, Gray), when they become numerous, but the majority soon go north, and during summer their presence is chiefly shown by the alien egg in the small bird's nest. In fall, however, flocks of any number up to 300 or 400 are frequently seen between September 16 ('94) and November 19 ('94). On November 11, '94, I came across an enormous flock of birds, 10,000, or more; they entirely covered a 25-acre field. Careful investigation with a field glass showed about equal numbers of Cowbirds and Red-winged Blackbirds.

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Extreme nesting dates are May 21 ('93), when 2 eggs were in a Robin's nest with 3 of the owners, and August 25 ('95), when a young bird was being fed by Indigo Birds. As a rule, only one egg is found in a nest in Maryland; the only instance of more, beside the one mentioned above, that I know of, is 3 in a Wood Thrush's nest with one of the owners, found in Talbot County on July 25, '95 (Tylor).

Xanthocephalus xanthocephalus (497). Yellow-headed Blackbird.

Near Baltimore specimens of this western bird have been taken as follows: On September 10, '91 a male was shot from a flock of Red-winged Blackbirds feeding in a wild oat marsh near Curtis Bay by Mr. Otto Nickel, who presented it in the flesh to A. Resler, in whose collection it now is. On September 18, '93, a female was shot from a bunch of Blackbirds at Patapsco marsh by Richard Cantler; this I secured for the Maryland Academy of Sciences. On October 1, '94, Mr. Edwin Schenck got another female at Patapsco Marsh; it was flying by itself. This one had the feathers removed by an over-active cook.

"A female was brought me on August 29, '92, that was killed from a flock of Blackbirds on the marshes adjoining Washington. This is the first record for the District of Columbia" (E. M. Hasbrouck, Auk, x, 92).

Agelaius phœniceus (498). Red-winged Blackbird.

Resident in tidewater Maryland, but not found in the uplands during winter. Nesting among the reeds, grass or bushes of swamps or wet meadows, I was rather surprised when a nest was found in a wild aster on top of a hill and fully a mile away from the nearest piece of swamp and one-eighth of a mile from the run. On May 13 ('94, Tylor) eggs were found in Talbot County; near Baltimore, from May 18 ('90) to July 26 ('81). Sets are 1 of 1, 10 of 2, 44 of 3, 30 of 4, and 3 of 5. At Vale Summit I only noted a single female on June 13, '95.

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Sturnella magna (501). Meadowlark.

Common resident; numerous in flocks in spring and fall. On May 10 ('91, Wholey) 2 fresh eggs were found and on July 21 ('95) 5 fresh. Sets are 1 of 4, 5 of 5, and 1 of 6.

Only a few at Vale Summit, June 5 to 14, '95.

Icterus spurius (506). Orchard Oriole.

Common summer resident. First noted at Washington on April 25 (Richmond); at Hagerstown, April 30 ('79, Small), at Knoxville, May 4 ('94, Fisher), and at Baltimore, May 5 ('95), while on May 7 ('93), they were common. They leave as soon as the young are able to go with them, and but few individuals are seen after August 4 ('95); the last on September 8 ('95).

Eggs are noted from May 30 ('93), to July 12 ('83). Sets are 2 of 3, 2 of 4, and 3 of 5.

Only one pair was at Vale Summit, June 5 to 14, '95.

Icterus galbula (507). Baltimore Oriole.

Locally common during summer. On April 29 ('93, Gray) both males and females were observed, but that they arrive earlier is shown by a pair having started to build on May 2 ('91). They are numerously recorded until September 8 ('95), a few until October 6 ('94).

At Waverly a pair started to build on May 2 ('91), and finished the nest on May 14. The year before they did not start until the 15th, and the nest was finished on the 21st; both were placed quite close together and within 20 feet of the veranda. On June 7 ('82) a nest contained 2 fresh eggs; on June 23 ('95) young were in a nest, while flying birds were still being fed on July 21 ('95).

At Hagerstown they were noted on April 27, '80, on May 12 they were building, and on the 18th they had eggs (Small). At Vale Summit, June 5 to 14, '95, they were numerous, the nests containing either eggs or small young.

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Scolecophagus carolinus (509). **Rusty Blackbird.**

Very common during migration; quite a number winter in tidewater Maryland. First noted in a large flock on September 30 ('94), the last were taken May 7 ('88, Resler). As a rule, they unite with flocks of Cowbirds, Red-winged Blackbirds or Purple Grackles, but sometimes they are seen in flocks by themselves.

Quiscalus quiscula (511). **Purple Grackle.**

Resident; it takes remarkably severe weather to drive this species from tidewater Maryland in winter. In the uplands they are numerous from March 1 ('95) to July 20 ('95) and not uncommon until early in November. Nests with eggs are recorded from April 28 ('94, Tylor) in Talbot County and from May 6 ('92) in Baltimore County, until June 8 ('84). Sets are 2 of 2, 5 of 3, 5 of 4, 13 of 8, and 4 of 6. Nesting anywhere, a bunch of cedars seems to be preferred. The nest is usually placed in a crotch, but other situations are frequently chosen, notably the spaces in the rough sides of the Fish Hawk's nest. On May 14, '81, I found one in a hollow of a tree not seven feet from the ground, and on May 22, '92, another in a partially torn out Flicker hole. In '91–2–3, they nested inside the barn on the Hampden property, in Dulaney's Valley, placing their nests on the rafters and roof-sill (J. H. Pleasants, Jr.,).

Quiscalus quiscula æneus (511*b*). **Bronzed Grackle.**

"Occasionally east of the Alleghanies, from Virginia northward" (Manual, 380). "Mr. Ridgway notes for us 'several specimens seen' but considers it 'rare.' Mr. Wm. Palmer notes one in his possession shot by Lewis McCormick at Fall's Church, Va., and several obtained by Henry Marshall, at Laurel, Md.," (A. C., 73). One was shot in Prince George's County, by Fred. Zeller, (Smith. Report, '86, 665), and another at Laurel, Md., by George Marshall (*Ibid.* 724).

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"Little more than a straggler, and individuals passing through here hardly remain to breed. However, I have a male shot April 6, '86, a date when ordinary *quiscula* is nesting, and a female shot April 2, '87, about the time ordinary *quiscala* are laying their first eggs" (C. W. Richmond, Auk, v, 19).

I have a male taken on March 1, '95, in Dulaney's Valley, and careful investigation, at short range with a field glass on March 10, 17, 24 and 31, showed that about ⅓ of each flock of Grackle's were referable to this race. On April 21, '95, at least one male was observed.

Quiscalus major (513). Boat-tailed Grackle.

This species nests in the stunted pines and alder bushes (*Alnus maritima*) that grow on our ocean beach, where nests have been found by Mr. C. W. Dirickson, of Berlin, and on July 7, '92, Mr. W. N. Wholey found a colony near Ocean City, the nests containing young of different ages; a deserted one, however, held 3 rotten eggs. In June, '94, I visited this locality and found the bushes burned down; between Delaware and Virginia I did not see a single grackle.

On May 6, '93, one was with a flock of Purple Grackles at Townsend Street just west of Fulton Avenue (Gray), and on May 17, '93, one was noted at North Point.

A small colony was found at Smith's Island, Va., where they were breeding; eggs and small young being found, May 16–24, '94 (Richmond).

Family FRINGILLIDÆ—Finches, Sparrows, etc.

Pinicola enucleator (515). Pine Grosbeak.

I can find no reference to this species, except that Dr. Coues says: "Northern border of United States in winter, sometimes south to Maryland" (Key, 343). "An extremely rare and probably only accidental visitor in severe winters" (A. C., 56). "Occasionally to Maryland" (Birds N. W., 105). "We have no recent records, and the old ones are mere traditions—*i. e.*, we have no precise dates or records of specimens" (Richmond).

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Carpodacus purpureus (517). Purple Finch.

Common in flocks during winter, they were exceedingly numerous round Baltimore during the severe season of '92–3. Extreme dates are October 1 ('90, Resler) and May 31 ('93, Fisher). At Washington it is given as "common in migrations, less so in mid-winter. One was shot September 17 ('87), by H. W. Henshaw. I saw a flock at Great Falls, Md., on September 24–5 ('89), and one was shot on May 13 ('85), by Dr. H. M. Smith" (Richmond).

"Not known at Hagerstown until May 3, '83, when they swarmed in the town" (Small).

Passer domesticus. English Sparrow.

The first English Sparrows brought to this country were 8 pairs, liberated in Brooklyn in the spring of '51, but nothing is known of what became of them. Two years later, 100 were liberated there and the importation was kept up for 30 years, the birds being liberated at widely different points of the country, 2500 or more birds being introduced.

"In June, '74, a few birds were brought to Baltimore by an English Captain and liberated in Franklin Square. These are the first birds we have any knowledge of that came to Baltimore direct" (*Baltimore American*, August 31, '93). At the following points in Maryland they introduced themselves,[1] and were noted in the following order:

'65 Hancock.	'77* Mechanicstown.
'68 Cumberland.	'77* Union Bridge.
'70 Williamsport.	'78* Frostburg.
'72* Manchester.	'78* Lonaconing.
'75* Boonsboro.	'78 Middletown.
'75* Oakland.	'78* Sharpsburg.
'76* Clearspring.	'79* Burkettsville.
'76* Hagerstown.	'79* Emmettsburg.
'76* New Windsor.	'79* Sandy Springs.
'76* Smithsburg.	'80 Grantsville.
'76* Taneytown.	'80 Salisbury.
'76* Westminster.	* About.

[1] For a full account of the introduction, etc., of the English Sparrow, see "The English Sparrow in North America," by W. B. Barrows, United States Department of Agriculture, Division of Economic Ornithology and Mammalogy, Bulletin No. 1, 1889.

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Now they are all over the State and here to stay, being common in the cities and towns, while there is scarcely a house in the country without more or less of them round it. In Baltimore City they are frequently seen building in the winter; these, I believe, are only roosting nests. On May 17 ('91) eggs about one-half incubated were taken, and on August 16 ('91) birds, just hatched, were found. Sets are 2 of 2, 2 of 3, 9 of 4, 7 of 5, and 2 of 6.

Loxia curvirostra minor (521). American Crossbill.

Very irregular in its movements; I have only observed this species once. On November 11, '94, about 25 were feeding on the cones of a small scrub pine, at the north end of Dulaney's Valley; they were quite wild, and did not remain ten minutes; when flushed, they flew clear out of sight.

At Lawyer's Hill, Howard County, about a half mile from Relay, in March, '90, Mr. C. Gamble Lowndes found "a flock of about 40 in a small bunch of pines; firing into them, two came to the ground dead, and several others, also dead, hung from the branches by their bills or claws, so that they were dislodged with difficulty. The others were all killed during a week with a small rifle, and were quite good eating. At night they roosted in a small ravine filled with pines and scrub oaks, and they spent the entire day in the clump of pines."

On January 15, '91, one was taken at Bush River, by Mr. Basil Sollers. Late in October, '89, two were shot out of a flock of about 20 in Talbot County (Tylor). At Cumberland "it is seldom seen; some years ago I killed one out of a flock with a cane" (Z. Laney).

"On May 23, '84, Mr. Geo. Marshall shot two, male and female, from a flock of five, near Laurel, Md. The female showed unmistakable evidence of having recently incubated. Two days later another male was shot in the same locality" (Smith. Report, '84, 146).

"On May 17, '85, an adult male and a young bird in the striped feather, barely able to fly, were seen by me in a pine sapling, a short distance beyond the city (Washington) limits" (Hugh M. Smith, Auk, ii, 379).

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"For a long time regarded as extra rare and irregular in winter; in December, '87, they were numerous at Washington, and every local collector secured a series. Individuals were caught alive in the Smithsonian grounds and in the Agricultural Department Park; they were seen until April 19, '88. In the following winter they were rather rare. In '90, again they were uncommon, but remained until late, individuals and flocks being noted on May 10, 16, 17, 21 and 24. Specimens taken on some of these dates showed no signs of breeding. I have few records for '91, '92 or '93, except that Mr. Ridgway, who lives at Brookland, D. C., near an extensive patch of pines, observed them all summer in small numbers, and still reports them up to June, '95. In the past winter, '94–5, Mr. Figgins reported them common near Kensington, Md., flocks appearing at short intervals throughout the winter. He mentions seeing hundreds on March 24; his last date is April 7, when about a dozen were seen. Mr. R. S. Matthews and I saw two small flocks late in April '95" (Richmond).

Loxia leucoptera (522). White-winged Crossbill.

"South in winter to or beyond 40°" (Manual, 393). Audubon mentions having secured a specimen "in Maryland a few miles from Baltimore" (iii, 191), and Mr. Henry Marshall has one, shot at Laurel about '74 (A. C., 57).

Acanthis linaria (528). Redpoll.

"Rare and irregular, perhaps only an occasional visitant in severe winters" (A. C., 57). One specimen, a female, was taken by Dr. T. H. Bean at Fort Runyon, Va., on February 19, '75" (Wm. Palmer, Auk, xi, 333). Audubon says (iii, 121): "I have seen several that were obtained near Baltimore, Md."

Spinus tristis (529). American Goldfinch.

Common resident; they commence flocking by the middle of September and hold together until early in June. On April

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30 ('93), however, I saw an early pair mating, the male being in nearly full summer plumage. While no doubt they nest earlier, the first note I have is of a pair building on July 12 ('91), the latest date is September 9 ('94), four fresh eggs. Sets are 1 of 3, 3 of 4, 2 of 5, and 1 of 6. At Vale Summit they were not numerous and still in flocks June 5 to 14, '95.

Spinus pinus (533). Pine Siskin.

Irregular winter visitor, usually found among the pines. On November 24, '92, quite a large flock was near St. Mary's Industrial School; on January 29, '93, a flock of about 20 was at St. George's Avenue, and on March 1, '79 (Resler), a number were at Bayview.

At Washington, "very abundant some winters between October and April; at times, several years will pass without one being seen" (Richmond).

Plectrophenax nivalis (534). Snowflake.

Irregular winter visitant in cold seasons. On February 6, '92 (Gray), a flock of eight was seen at Calverton; on February 10, '95, two were noted on the Falls Turnpike near Melvale, and on the same day (Fisher) two were seen on the drive round Druid Hill Park lake.

One specimen has been taken at Washington (Richmond).

Calcarius lapponicus (536). Lapland Longspur.

"South in winter to northern United States, sometimes (rarely) as far as South Carolina" (Manual, 404). On February 10, '95, just after the blizzard, all our roads being impassable to vehicles, I walked out to Lake Roland. At the point where the Northern Central Railroad crosses the Falls Turnpike a small part of the bank had been cleared of snow by the wind, on this were about 20 Longspurs, with 8 or 10 Song Sparrows and about 25 Tree Sparrows. They allowed me to approach within three feet.

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"On December 11, '86, while Dr. Fisher and I were riding along the road to Falls Church, Va., and distant from Washington perhaps four miles, we saw a flock of 15 or 20 Horned Larks by the roadside. Scattered through the flock were half a dozen or more Longspurs, one of which was secured. Comparatively little collecting has ever been done about Washington in winter, and to this fact, rather more than to its excessive rarity, is due, I am persuaded, the absence of the species from the local lists. Although probably not a regular migrant, the species occurs here in small numbers, I am inclined to believe, every hard winter. However, it is to be remarked that the records for this bird so far south are very few" (H. W. Henshaw, Auk, iv, 347).

Poocætes gramineus (540). Vesper Sparrow.

Resident; abundant during migrations from March 20 ('92,) to May 23 ('93, Wholey), and from September 22 ('95) to December 2 ('94). During summer they are not very common, and only a few winter with us. On June 19 ('90, J. H. Fisher, Jr.) 3 slightly incubated eggs were taken. At Hagerstown it is given as "not common; occasionally seen in June, July, September and October" (Small). At Vale Summit on June 11, '95, I found one pair feeding young just out of the nest.

Ammodramus princeps (541). Ipswich Sparrow.

"Breeding on Sable Island, N. S.; in winter migrating along the Atlantic coast south to Virginia." (Manual 407). "Winter resident along the New Jersey coast; not abundant, though probably regular." 9 specimens are recorded between November 16 ('80) and April 3 ('89) (Birds, E. Pa. and N. J., 112–3).

"Those who care to visit in winter the bleak, wind-swept sand hillocks of our Atlantic coast will find this bird much less rare than it was once supposed to be" (Chapman 291).

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Ammodramus sandwichensis savanna (542*a*). Savanna Sparrow.

Fairly common migrant, some possibly wintering; noted from October 6 ('95,) to November 9 ('92, Resler), and from March 18 ('91, Resler) to May 12 ('92, Pleasants). At Washington "4 were noted on October 14, '94, (J. D. Figgins and Wm. Palmer); a few winter" (Richmond). At Hagerstown "quite common during the fall migration of '80" (Small). No doubt it winters along our sea-coast for "at Cape May and probably all along the coast of southern New Jersey the Savanna Sparrow is an abundant winter resident" (Birds, E. Pa. and N. J., 113).

Ammodramus savannarum passerinus (546). Grasshopper Sparrow.

A few wintering; this species is common from April 10 ('95, Fisher) until November 4 ('94). It is usually flushed from the ground, but during the breeding season it mounts on a weed or even to the top of a fence to sing the very peculiar song from which it derives its name.

Although very numerous in the breeding season, the nest is seldom found, it being placed on the level ground in the open field. Young out of the nest were being fed on June 4 ('93), and on August 11 ('94) birds 4 or 5 days old were in a nest. Sets are 3 of 3, and 3 of 4.

Common at Washington from March 30 ('95) to October 21 ('87, Richmond). At Vale Summit a number were observed June 5 to 14, '95.

Ammodramus henslowii (547). Henslow's Sparrow.

"Known from this region for many years, this has been considered one of the rarest sparrows, although always found in one or two localities. On May 30, '92, while exploring Johnson's Gully, Maryland, 16 miles south of Washington, a large colony was found" (E. M. Hasbrouck, Auk, x, 92). "Not

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uncommon in several localities near Washington. At Kensington, Maryland, where it is rather common, Wm. Palmer found a nest with young on June 1, '94, and J. D. Figgins shot 2 on October 14, '94. It is also rather common at Laurel, where, on April 10, '89, Mr. Ridgway shot a male" (Richmond) and Geo. Marshall secured specimens on May 4 and 21, and August 11, '94. In Howard County, specimens were taken on April 17, and August 3, '93 (Resler).

Ammodramus caudacutus (549). Sharp-tailed Sparrow.

"Abundant summer resident on the salt marshes along the New Jersey coast and for some distance up the shores of Delaware Bay. Mr. I. N. DeHaven finds a few 'sharp-tails' nearly every winter on the Atlantic City meadows, but they are by no means common at this season" (Birds, E. Pa. and N. J., 114).

On June 7, '94, I found a number along the beach some miles south of Ocean City, Maryland.

Ammodramus caudacutus nelsoni (549*a*). Nelson's Sharp-tailed Sparrow.

"Fresh water marshes of the Eastern United States, and during migrations, to marshes of the Atlantic coast, Massachusetts to South Carolina" (Manual, 413). "Rare transient on the New Jersey coast, though probably of regular occurrence. The least common of the three races of Sharp-tailed Sparrows on our coast, it will probably be found to be more abundant in fall than in spring. Specimens have been secured May 9 and October 2, '92, by Mr. I. N. DeHaven" (Birds, E. Pa. and N. J., 115).

In Virginia the following specimens have been taken, "one by C. Drexler in September, '62, another by E. J. Brown, at Cobb's Island on May 11, '92, and a third by myself on 4 mile Run marsh, Alexandria County, on September 18, '93," (Wm. Palmer, Auk, xi, 333).

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Ammodramus caudacutus subvirgatus (549*b*). Acadian Sharp-tailed Sparrow.

"Was found associated with the other two races at Atlantic City on October 2, '92, and a number of specimens shot. It appeared to be more numerous than *nelsoni* but less so than true *caudacutus*. This species apparently winters further south, for all the winter specimens so far taken by us in New Jersey were *caudacutus*. Doubtless more careful search will show the *nelsoni* and *subvirgatus* to be of regular occurence in both migrations" (Witmer Stone, Auk, x, 85)." Regular transcient visitor on the New Jersey coast marshes" (Birds, E. Pa. and N. J., 114).

Ammodramus maritimus (550). Seaside Sparrow.

"Abundant summer resident on the New Jersey coast marshes and on the shores of Delaware Bay, arrives at Atlantic City about April 20 and departs October 15. In Cape May County, Mr. W. L. Baily secured several specimens February 22, '92, which would indicate that a few of these birds winter there occasionally" (Birds, E. Pa. and N. J., 115). Between, May 14 and 28, '94, at Smith's Island, Va., they were "breeding and quite numerous, we secured 43 specimens of this bird." (E. J. Brown, Auk, xi, 259). "On Smith's Island I found 3 nests May 18, '94, with 4, 5, and 5 eggs and on May 23, '94, another with 4 eggs" (Richmond).

On May 27,'93, I came accross a pair of these birds, one of which I secured, but careful search failed to find the nest. They were in a marsh on Start's Point, between Chester River and Langford's Bay, in Kent County. On June 6, '94, I found a nest with 5 eggs nearly hatched, on our ocean front quite close to the Virginia line, where they were rather common.

Chondestes grammacus (552). Lark Sparrow.

This bird of the Mississippi Valley occasionally strays to the Atlantic coast. "Up to date, our knowledge of the occurrence of the Lark Finch in the neighborhood of Washington is limited

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to the capture of a single specimen by Mr. Roberts, on August 25, '77 (at Fort Runyon, on the Viginia side of the Long Bridge, A. C., 66), and the observation of 2 individuals in the Smithsonian grounds by Mr. Ridgway (on August 27, '77, Auk, iii, 43). To the above is to be added the capture of a second specimen, an adult male, on August 8, '86, by the writer" (H. W. Henshaw, Auk, iii, 487).

Zonotrichia leucophrys (554). White-crowned Sparrow.

Regular, though not common, migrant from October 7 ('94) to October 23 ('92), and from May 6 ('93 and '94, Wholey) to May 21 ('92, Gray), and on the same day at Sandy Springs (Stabler). At Washington, "from October 13 ('93), when several were seen by H. W. Henshaw and A. K. Fisher, to November 25 ('88), when one was shot by J. D. Figgins, and from the middle of April to May 17 ('86), when one was shot out of a flock of about a dozen" (Richmond).

Zonotrichia albicollis (558). White-throated Sparrow.

Winter resident; common; more numerous during migrations. Noted from September 21 ('93, Gray), and common from September 29 ('95) to May 13 ('92), the latest record being May 19 ('95), when two, a male and female, were found in a brush pile in Dulaney's Valley, and some years ago one was taken on the same date by Mr. A. Resler. At Washington "one was shot on September 15 ('89), and they were common from September 30 ('90, '94) until May 20 ('88), when one or two were noted and a male was shot by W. F. Roberts. On May 21 ('86) one was shot and ('88) several were heard singing" (Richmond).

Spizella monticola (559). Tree Sparrow.

Equally numerous during winter with the "Snowbird," this species is not so commonly observed, as it does not come round the house, preferring the briar and weed patches. On October 7 ('94) I found it common in flocks with Snowbirds; and on

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April 29 ('94) quite a number were in a flock with Field and Chipping Sparrows. At Washington "from late in October to early in April" (Richmond).

Spizella socialis (560). Chipping Sparrow.

First noted on March 16 ('94), and common from March 25 ('94) to November 27 ('92), 8 or 10 were seen on December 2 ('94), and about a dozen on December 4 ('92). At Washington, "some spend the winter, but not in numbers sufficient to be detected every season. On March 12 ('90, J. D. Figgins) four were seen. Common from the end of March to November 24 ('89), one was seen on December 14 ('90)" (Richmond). Mating on April 22 ('94), the first nest with eggs was found on May 10 ('91), the last on August 28 ('92), and on September 16 ('94) young just out of the nest were observed. Sets are 2 of 2, 27 of 3, and 14 of 4.

At Hagerstown their arrival is noted on March 30, '79, March 18, '80, and March 21, '81. Under date of April 15, '83, is the following: "Has any one ever noted the Chippy's fondness for the sap of the grape vine? They make a regular habit of drinking large quantities when the vines have been trimmed in spring. Do they do this for water, or for any nourishment there is in the sap? I rather think the latter, as they drink too much for simply quenching their thirst" (Small).

Only a few at Vale Summit, June 5 to 14, '95.

Spizella pusilla (563). Field Sparrow.

This is our most common breeding sparrow, being exceedingly numerous from March to November. During mild winters, a number stay with us, and even during the cold winter of '92–3 a flock was seen on December 4, about 20 on January 4, and a single bird on January 22. At Washington it is noted as "a common regular winter as well as a summer resident" (Richmond). Nests with eggs are noted from May 8 ('91) to August 16 ('91). Sets are 5 of 2, 22 of 3, and 15 of 4.

At Vale Summit they were not common, June 5 to 14, '95.

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Junco hyemalis (567). Slate-colored Junco.

A winter resident; first noted on September 28 ('93, Gray); it was common on September 30 ('94), but, as a rule, they do not become numerous until the middle of October, remaining so until April 23 ('93, Fisher), the last is recorded on May 1 ('74, Resler. '92). At Washington "from September 30 ('94), when several were seen by Messrs. Figgins Matthews and Palmer, to April 27 ('90), when several were seen. On May 1 ('87), one was seen and on May 4 ('—) one was shot" (Richmond).

Junco hyemalis shufeldti (567*b*). Shufeldt's Junco.

A western bird. "On April 28, '90, my son, A. W. Ridgway, shot a female of this sub-species near Laurel, Maryland. It was shot out of a small flock in which, my son thinks, were others of the same kind, but he may have been mistaken" (Robt. Ridgway, Auk, vii, 289).

Melospiza fasciata (581). Song Sparrow.

Common resident; liable to be heard singing at any time, even in the depth of our most severe winters. Nesting dates range from May 3 ('91, Wholey), 5 fresh eggs, to September 11 ('92), when young leave a nest. Sets are 1 of 2, 5 of 3, 13 of 4, and 8 of 5. Situations of nests noted show 8 built up from the ground in bushes, etc., 7 on level ground in grass, and 8 in hollows in the sides of banks, while one was in the side of a haystack (Fisher).

At Hagerstown, Small says, "one pair has lived in our yard and built two nests each year; averaging from 8 to 10 feet above the ground; the lowest was 4 feet up, and one was fully 25 feet up in a western vine growing against the house. Cowbird eggs were twice deposited, when all the eggs were thrown out and they started to build a new nest the next day. Twice, one of this pair was killed, but a few days later the survivor secured a mate."

Only a few were seen at Vale Summit, June 5 to 14, '95.

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Melospiza lincolni (583), Lincoln's Sparrow.

"In the Atlantic states it is apparently rare; in the course of all my collecting I never saw it" (Birds, N. W., 136). L. M. McCormick mentions 2 specimens obtained in the District of Columbia, without date (Auk, i, 397). "Mr. Henshaw collected on the Virginia side of the Potomac 3 specimens in May, '85. Wm. Palmer has taken 2 birds; and Mr. Ridgway has noted this species on several occasions near Laurel, Md. (Auk, v, 148). "On May 7, '92, J. D. Figgins got one at Kensington, Md., on May 12, '87, R. Ridgway got one at Gainesville, Va., and on May 18, '84, H. W. Henshaw got one, the first on record for the District of Columbia, Wm. Palmer shot one on September 30, '94, and Robert Ridgway shot one on October 18, '89, at Laurel" (Richmond).

Melospiza georgiana (584). Swamp Sparrow.

Occasionally noted during winter, and common from September 30 ('94) to November 11 ('94), and again from April 8 ('93, Gray) to April 29 ('94); extreme dates are September 16 ('94) and May 12 ('94, Wholey). At Washington, "from September 28 ('90) to the last of October, when they sometimes swarm in suitable places; a few winter, and in April they again become common, the last being noted on May 16 ('88)" (Richmond).

"Resident; though much more abundant during the migrations than at other times. The Swamp Sparrow breeds on the marshes of Tinicum Township, Delaware County, Pa., and in other similar situations, but seems to be rather locally distributed during the breeding season in southern Pennsylvania" (Birds, E. Pa. and N. J., 118).

Passerella iliaca (585). Fox Sparrow.

Common during migrations, from October 21 ('94) to December 16 ('94), and from February 13 ('92, Gray) to April 23 ('92, Gray), a few occasionally wintering. On November

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5, '93, I saw between 400 and 500 in Dulaney's Valley, one of which gave me a wild burst of song. At Washington, recorded "from October 18 ('94) to April 15 ('94). Two were shot on April 21 at Laurel, by Geo. Marshall" (Richmond); noted at Hagerstown in May, '80, and also "a few all winter" (Small).

Pipilo erythrophthalmus (587). Towhee.

Common summer resident, occasionally wintering. Noted from March 8 ('94) to November 13 ('92), and common from April 2 ('93) to October 21 ('92); nests with eggs range from May 13 ('94), to August 28 ('91, Fisher). Sets are 8 of 3, and 3 of 4. Six nests were on the ground, the others elevated, the highest being 6½ feet up in a cedar.

During the severe winter of '92–3, Mr. W. N. Wholey and I watched a flock from December 8 to February 14, seeing it 3 or 4 times a week. Neither of us could ever count the flock; sometimes there seemed more, sometimes less, but we estimated it to average about 50 birds. There was snow on the ground all this time and the temperature went down as low as 1°, and for over a month the maximum kept below 32° (*Fahrenheit*).

In Somerset County they were numerous from November 15 to 21 ('94, Fisher).

At Vale Summit they were common, June 5 to 14 ('95).

Cardinalis cardinalis (593). Cardinal.

Resident, old birds generally seen in pairs, the young (presumably) going in flocks in fall and winter, occasionally a few pairs of adults may be found quite near each other. Nesting dates range from May 3 ('92, Wholey), a nest ready for eggs, to August 18 ('83), 3 eggs. Sets are 1 of 2, 17 of 3, and 1 of 4.

Habia ludoviciana (595). Rose-breasted Grosbeak.

A migrant, seen at irregular intervals and not to be procured every year; it has been fairly well noted from April 28 ('93, Resler) to May 20 ('76, Resler) and from September 11 ('80, Resler) to September 25 ('93, Gray).

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"A regular migrant at Washington, not rare, but of irregular abundance from May 3 ('91 and '92) to May 16 ('88 and '90) and from August 29 ('87), when Mr. R. Ridgway shot one at Gainesville, Va., to September 28 ('89)" (Richmond).

On Dan's Mountain, in Alleghany County, I found 2 pairs, one located at Pompey Smash, the other about a mile distant at Lauertown. Morning and evening, from June 5 to 14, '95, both the males could be heard singing. On June 8, I found the nest of the Pompey Smash pair; it contained a young bird not 24 hours old and 2 infertile eggs. On the 14th I again visited this nest; on being disturbed the young one scrambled out of the nest and fell to the ground; I replaced it and hope it arrived at maturity, and will live to a green old age.

Guiraca cærulea (597). Blue Grosbeak.

This large sized edition of the Indigo bird seems to nest more or less regularly in southern Maryland, Washington being about its northern limit, where it is noted as "rather rare, from first week of May to middle of September" (A. C., 68). "During the summer of '87 a pair nested twice on my father's farm, about a half-mile east of the District of Columbia. On June 24 I took the first nest and 4 eggs from the fork of a peach tree, about 7 feet up. . . . In August evidently the same birds nested in a small cedar. I have observed them every season since, but have found no more nests" (A. B. Farnham, Oologist, viii, 219–20).

At Washington "a male was seen on June 30, '89; a pair, male and female, were taken by Wm. Palmer on August 15, '92, and several were seen and one shot on September 19, '86. At Kensington, Md., a nest was found early in June '95, by J. D. Figgins, and another with 4 eggs was found at Laurel about June 10, '95, by Geo. Marshall" (Richmond). One was taken in Howard County, on July 29, '93 (Resler). On August 3, '91, a pair were seen feeding flying young on the Windsor Road, about a half-mile this side of Powhattan (Gray

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and Blogg). At Hagerstown "a male with testes as large as peas was shot by A. J. Jones on May 23, '82" (Small).

Passerina cyanea (598). Indigo Bunting.

Common summer resident; first noted on April 30 ('92, Gray) and common from May 2 ('93) to September 30 ('94); the last was taken on October 5 ('87, Resler). At Washington, "noted on April 29 ('94, Currie, Preble and Hasbrouck); it was still common on September 30 ('90, '94), while one was found on October 15 ('90); and on December 13 ('87) Mr. M. M. Green shot one, it was 'fat and healthy'" (Richmond).

A nest ready for eggs on May 25 ('90) contained 3 on June 1, and on August 29 ('91); a brood of young left a nest on being disturbed. Sets are 1 of 1, 5 of 2, 17 of 3 and 5 of 4.

At Vale Summit they were common, June 5 to 14, '95.

Spiza americana (604). Dickcissel.

"A summer resident. This bird used to arrive regularly about the first of May, and leave towards the end of September, meanwhile being very abundant. . . . Now, however, the birds seem to have forsaken us, few, if any, having been heard for the past few years" (A. C., 67). "Extremely rare; this bird is said to have been abundant formerly, but it appears to have withdrawn almost entirely from this vicinity. A male, seen by Mr. Henshaw about the last of May, '87, was very likely nesting" (C. W. Richmond, Auk, v, 22). "At Jefferson, Maryland, Mr. J. D. Figgins got one on August 4, '90, and 2 more the next day" (Richmond).

The case seems to be paralleled near Baltimore. I have been several times told of its former abundance, and how easily it was taken with bird-lime. The only late item, however, is "on May 7, '92, near Wyndhurst Avenue, on the Baltimore and Lehigh Railroad track, I heard a strange bird song; locating it, I saw a male Black-throated Bunting, it was in plain sight and identification is positive" (Wholey). Specimens were taken by Mr. Resler on May 20, '76, June 10, '76 and October 2,

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'80, at Back River. At that time they were quite common, and no special attention was paid to them.

Family TANAGRIDÆ—Tanagers.

Piranga erythromelas (608). Scarlet Tanager.

Summer resident; generally dispersed, but local and not very common. Noted from May 4 ('92, Resler) to October 7 ('93, Pleasants). At Washington "from April 25 ('95) to October 7 ('88, W. T. Roberts)" (Richmond).

Nests with eggs are noted from June 2 ('88, J. H. Fisher, Jr.) to July 18 ('93, Pleasants), while in Howard County three fresh eggs were collected on August 1 ('92, Resler). Sets are 2 of 3 and 3 of 4.

Only a single pair at Vale Summit, June 8, '95.

Piranga rubra (610). Summer Tanager.

Summer resident; about as numerous as the last species, noted at Washington from April 28 ('94, Richmond) and at Baltimore from April 30 ('93, Blogg) to September 12 ('93, Gray). Eggs are recorded from June 7 ('93, Wholey) to July 10 ('93, Bloggs). Sets are 4 of 3 and 1 of 4.

In '90–1–2, Scarlet Tanagers occupied a piece of open woods back of our house in Dulaney's Valley; in '93, there were no Scarlet Tanagers, but several pairs of Summer Tanagers; in '94, no Tanagers appeared; but this year ('95), four or five pairs of both species spent the summer, some of them nesting quite close to the house. Both species have been more numerous this year than I have known them before.

Family HIRUNDINIDÆ—Swallows.

Progne subis (611). Purple Martin.

Common summer resident. First noted in Kent County on March 30 ('95, Fisher), and in Baltimore County from April 2 ('93) to October 15 ('93). In spring they are generally first observed at the bird boxes, these they leave as soon as the young

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are able to go with them, the latest date being August 27 ('94), when only one pair was left. On July 28 ('95), 6 were in a small dead tree in Dulaney's Valley; as there were only one adult male, this family presumably had started to migrate. In this same tree on August 12 ('94), at 10.40 A. M., I saw 18 (3 adult males) all sound asleep, with their heads under their wings. On being flushed by a knock on the tree they flew round for a few minutes and returning, settled themselves again, evidently played out from a long migration flight. At Bay Ridge, towards dusk, on August 18 ('95), quite a large number flew south in an uneven but regular column.

On May 18 ('92) a box held 8 nests in various stages of construction, from just started to ready for eggs, and on May 29 ('94) another had 21, ranging from just started to having the complete set of 5 eggs, while as late as July 9 ('95, Henninghouse) 3 fresh eggs were taken. Sets are 3 of 5. Usually nesting in the boxes put up for them, on June 12, '94, I found nests with young under the eaves of cottages at Ocean City. At Washington they formerly nested in the tops of the columns of the Treasury Building, now "in crevices of the Post Office Department Building and the Masonic Temple" (Richmond). At Bay Ridge, on June 28, '93, several pairs were nesting in the hoods of electric lamps (Gray). At Cumberland on June 4, '95, I found them in the electric lamps, and also in cornices of buildings.

Petrochelidon lunifrons (612). Cliff Swallow.

Summer resident, extremely local and not common; but a colony may locate their nests under the eaves anywhere, occupy them any number of summers, then, without apparent cause, leave, sometimes coming back after one or more years. First seen on April 16 ('93), when 26 were flying in a loose flock; the last were also seen in a loose flock on September 3 ('93). At Washington, September 12 (A. C., 52). Nesting dates range from June 7 ('82), five fresh eggs, to July 23 ('93), when young birds were still in nests. On July 22 ('93), however,

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I saw quite a number on the telegraph wires, young and old, ready to go south. Sets are 1 of 1, 1 of 2, 2 of 3, 1 of 4, 1 of 5.

Chelidon erythrogaster (613). Barn Swallow.

This, our swallow proper, is an exceedingly numerous summer resident, there being scarcely a barn or out-building that has not its swallow nests on the rafters. First noted on April 3 ('80, Resler), on the 15th ('93) they were numerous, remaining so until September 20 ('90, Resler). Birds congregated on the telegraph wires, ready to migrate, have been seen as early as July 5 ('94). Nesting dates range from May 29 ('81), slightly incubated eggs, to August 9 ('93), small young birds. Sets are 1 of 1, 4 of 3, 6 of 4, and 10 of 5. At Washington they were noted March 30 ('90), and nests with 1 and 2 eggs were found on May 16 ('86, Richmond). At Hagerstown on March 20, '80 (Small).

A small colony was at Vale Summit June 5 to 14, '95.

Tachycineta bicolor (614). Tree Swallow.

Sparingly distributed along the shores of tidewater Maryland in summer, this species may be seen anywhere during migrations, when it is abundant. Noted from March 30 ('92, Resler) to October 17 ('94, Resler); quite a large number were flying south in a loose, desultory manner over Ferry Bar on August 12 ('95). At Washington it is recorded from "March 30 ('90), to October 14 ('94), when there must have been a wave of them, as Wm. Palmer got one and saw several at Kensington, Md.; Geo. Marshall saw one at Laurel, Md., and R. Ridgway saw 2 or 3 at Gainesville, Va." (Richmond). On October 14, '94, there was quite a large number in Dulaney's Valley. Several were seen at Harper's Ferry, April 8, '87, by F. L. Washburn (Birds Vas., 77). At Hagerstown in September, '82, and May, '83 (Small). Nests with eggs are noted from May 12 ('94, Fisher) to July 3 ('93, Blogg). Sets are 1 of 4, 2 of 5, and 1 of 6.

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Clivicola riparia (616). **Bank Swallow.**

Common summer resident. Quite a number were at Loch Raven on April 14 ('95), but they were down the necks earlier, for on April 19 ('95, Fisher), at Gunpowder, a new hole had been dug about a foot deep and two others a few inches. The last birds were noted September 12 ('85, Resler). At Washington, from April 25 ('86, '94) to September 15 ('90, Richmond). On July 17, '91, a large number, possibly between 3000 and 4000 were on a ducking blind at the mouth of Back River; they kept up an incessant twitter and were evidently ready to leave for their winter home. May 12 ('91), slightly incubated eggs, and July 17 ('92), young birds, are extreme nesting dates. Sets are 3 of 2, 2 of 3, 3 of 4, 3 of 5, 2 of 6, and 2 of 7.

Stelgidopteryx serripennis (617). **Rough-winged Swallow.**

Summer resident, but not as numerous as the Bank Swallow. Observed at Washington April 8 ('92, R. Ridgway, Auk, ix, 307), at Baltimore, April 19 ('79, Resler); the last recorded at Washington was shot on September 3 ('94, Richmond). Sets of eggs, noted from May 13 ('83) to June 15 ('84), are 2 of 4, 1 of 5, 1 of 6, and 1 of 7. "Numbers of these birds breed along the Potomac River in crevices of the rock; . . . a nest of 7 eggs found during June, '87, contained six eggs of this species and one of the Barn Swallow" (C. W. Richmond, Auk, v. 23). At Hagerstown, Small says ('80–'81), "the Bank and Rough-winged Swallows are about equally common."

Family AMPELIDÆ—Waxwings.

Ampelis cedrorum (619). **Cedar Waxwing.**

Resident, roving in flocks all the year, from which, in their leisurely manner, a pair will detach themselves and go to housekeeping, generally in July or August. Eggs are noted from June 17 ('92, Blogg) to August 21 ('92). At Vale Summit a nest had 5 fresh eggs on June 11 ('95). Sets are 1 of 3, 2 of 4, and 4 of 5.

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Family LANIIDÆ—Shrikes.

Lanius borealis (621). Northern Shrike.

Probably a regular, though rare winter visitor. On October 26, '87, one was taken on Patapsco Marsh (Resler); December 2, '94, one in Dulaney's Valley; January 10, '93, one at Bay View (A. Wolle); February 11, '92, one at Powhattan (Gray); February 19, '93, one was seen in Dulaney's Valley, and on February 25, '93, one was seen just west of the city (Gray). At Washington, "one was shot on December 26, '87; another on January 10, '91, and one on February 10, '46. Numbers of others have been taken" (Richmond).

Lanius Ludovicianus (622). Loggerhead Shrike.

A common resident in the south Atlantic States, wandering north in winter. Near Baltimore single birds are numerously recorded from August 26 ('92, Blogg) to April 23 ('93, Gray), and near Washington from "August 11 ('89) to April 6 (—); dozens have been reported, mostly, however, in midwinter" (Richmond). At Hagerstown "only seen a few times. One was seen in May eating a large beetle under the spruce in our yard, and one was noted in December, '80" (Small).

Family VIREONIDÆ—Vireos.

Vireo olivaceus (624). Red-eyed Vireo.

Very common summer resident. First noted on April 23 ('93); a week later they were numerous everywhere, remaining so until October 6 ('94), the latest date being of a single bird on October 11 ('93). At Washington "from April 22 ('91) to October 14 ('94, Palmer and Figgins), specimens were taken —one on October 17, '90; four on October 30, '94 (Palmer and Figgins), and one on November 11, '88 (Figgins)" (Richmond).

Nests with eggs range from June 8 ('85) to July 31 ('93), while young birds not long out of the nest and still being fed by the parents were seen on September 4 ('92). Sets are 11 of 2, 29 of 3 and 3 of 4.

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Vireo philadelphicus (626). Philadelphia Vireo.

"Not very common in the Atlantic States" (Key, 332). "A regular but rather rare spring and fall migrant, arriving here late in April or early in May; after the 20th of May it is seldom seen in Pennsylvania until it migrates southward in September" (Birds Pa., 264). "A very rare migrant;" 10 specimens are recorded between September 11 ('80) and October 6 ('91) (Birds E. Pa. and N. J., 126). "One taken on the Virginia side of the Potomac near Washington, on May 17, '88" (Wm. Palmer, Auk, vi, 74). "Wm. Palmer also got one or two additional ones, and J. D. Figgins shot one on September 16, '94, at Kensington, Md." (Richmond).

Vireo gilvus (627). Warbling Vireo.

Of local distribution, in some parts of Maryland it is a summer resident, but near Baltimore I have only found it as a migrant. On May 5, '82 (Resler), one was taken, the only spring note. In '94 I found it quite numerous in Druid Hill Park on August 21, 22 and 24, and again on October 4 and 6, but not between times. At Washington it is "a summer resident, not very common, from April 28 ('89) to September 10." Mr. Figgins found it very common at Kensington, Md., on August 23, '94 (Richmond).

At St. Michael's, Talbot County, on June 15, '94, a pair were very lively in a shade tree. At Hagerstown, "the Red-eye and Warbling Vireos are to be heard all through the long summer days; they both breed in town, but the Warbling is decidedly the most common, staying with us from the first week of May to October" (Small). In Cumberland, on June 4, '95, quite a number were in the shade trees.

Vireo flavifrons (628). Yellow-throated Vireo.

Regular, but not very common summer resident, more numerous during migrations. Noted from April 13 ('90, Pleasants) to October 6 ('94). In Dorchester County they were numerous,

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and specimens were taken on April 6, '93 (R. C. Watters). "A common summer resident at Washington, from April 20 to the middle of September. Wm. Palmer found a nest with 3 small young on June 1, '94" (Richmond). On May 27 ('93, Blogg) a nest held 3 half-incubated eggs; on June 15 ('93, Fisher) one contained young birds, and on June 19 ('92, Wholey) one had 4 eggs ready to hatch.

Vireo solitarius (629). Blue-headed Vireo.

A regular migrant, not common. Noted from April 19 ('93, Resler and Wholey) to May 11 ('93, Pleasants), and from September 26 ('94, Resler) to October 22 ('92, Gray). During spring single birds are usually seen; in fall, small parties of 4 or 5. At Washington "not uncommon in migrations, April 13 ('88, Hasbrouck) to May 10 ('85) and October 8 ('88) to October 26 ('90)" (Richmond). At Hagerstown "a few were seen in the spring migrations; they had a decided partiality for some climbing roses, and were very unsuspicious" (Small).

Vireo noveboracensis (631). White-eyed Vireo.

Common summer resident from April 22 ('91, Resler) to September 23 ('94). At Washington "from April 12 ('90) to October 12 ('90)" (Richmond). Nesting notes range from May 27 ('95, Fisher), 2 fresh eggs, to August 6 ('93), 2 birds about two-thirds grown. Sets are 1 of 2, 3 of 3 and 1 of 4.

While the nest is usually placed near water, or in a swampy place, on July 4, '94, I found a nest containing young nearly ready to fly, on top of a high, dry hill, fully $\frac{1}{8}$ of a mile from the nearest spring.

Family MNIOTILTIDÆ—Wood Warblers.

Mniotilta varia (636). Black and White Warbler.

First noted on April 15 ('93, Gray; '95, Resler), and numerous on April 23 ('92, '93). Gradually thinning out as the breeding season comes on, it is again abundant from early in August to

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September 16 ('94), after which it is occasionally noted until October 9 ('89, Resler). At Washington "from April 8 ('88) to October 18 ('92)" (Richmond). The nest, being placed on the ground, is seldom found; those noted are: May 16 ('91, Blogg), 3 eggs nearly hatched; June 1 ('89, Blogg), 4 birds and a rotten egg; July 4 ('92), 3 birds a few days old.

On Dan's Mountain they were very common. On June 5, 95, I found a nest with 5 nearly fresh eggs; it was placed in a crevice, about 4 feet up the perpendicular face of Dan's Rock, on the summit of the mountain.

Protonotaria citrea (637). Prothonotary Warbler.

"Rare or casual on the Atlantic coast north of Georgia" (Manual, 484). One was seen on May 2, '61, near Washington (A. C., 42.) "On May 17, '88, near Laurel, Mr. P. L. Jouy and I noticed a Prothonotary Warbler, and later, when we were in company with Geo. Marshall, another (or possibly the same one) was seen, but we failed to secure either" (R. Ridgway). On August 25 '95, I saw 2 in Dulaney's Valley; they were fussing with one another and allowed of quite close approach. "On May 11, '94, an adult male was taken at Mt. Vernon, Va., by E. M. Hasbrouck" (Richmond), and Captain Crumb has taken one at Cobb's Island (letter to W. H. Fisher).

Helmitherus vermivorus (639). Worm-eating Warbler.

Sparingly resident, from May 2 ('90, Gray) to September 10 ('92, Resler). At Washington "from April 29 ('88, Hasbrouck), it remains throughout most of September" (Richmond); at Hagerstown to September 19 ('79, Small). On June 7 ('85) a nest held 4 eggs slightly incubated; on June 25 ('93) 4 birds were nearly ready to fly; on July 2 ('93, Wholey) a nest was ready for eggs; on July 4 ('91) adults were feeding young barely out of the nest, and on August 15 ('91, Gray), a pair were leading full grown young. At Washington it has been found nesting along Rock Creek, where on May 31, '85, a nest

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with 6 well incubated eggs was found, and on June 14, '85, and June 5, '87, nests with 5 young about half grown were also found (C. W. Richmond, Auk, v, 23–4).

Helminthophila pinus (641). Blue-winged Warbler.

This species, fairly numerous in migrations, from May 5 ('95) to May 16 ('93, Wholey), and from August 18 ('91, Gray) to September 21 ('94), has been found as a regular, but rare summer resident along Gwynn's Falls, between Calverton and Franklin (Blogg and Gray), where in '92, on June 11 and 14, young birds just out of the nest were noted, and on the latter date 3 were caught. On July 5, another brood had just left a nest. In '93, on May 20, a nest was half built; on the 27th it contained one egg, but later it was deserted. On June 13 a nest was found containing 3 birds just hatched and an infertile egg; on July 1, another had 4 birds under a week old and an infertile egg, and on July 12, another nest was found with young birds. On May 29, '94, a nest was found with four fresh eggs.

On June 15, '95 (Fisher) a pair was seen at Mt. Washington where five days later I noted a pair feeding young, and on July 10, '91 (Fisher), one bird secured from a flock of 5 or 6 at Ruxton indicates its nesting there. "Geo. Marshall and others have found it breeding at Laurel, Md., and at Washington, where it is rare as a breeding bird, a nest was found by Mr. H. H. Birney early in June, '80, with 4 eggs about to hatch" (Richmond).

Helminthophila leucobronchialis (—). Brewster's Warbler.

The identity of this bird is not very clear, but it is supposed to be a hybrid; it has been found from Virginia to Connecticut, and as far west as Michigan. On May 15, '85, one was taken near Fort Myer, Alexandria County, Va., by Wm. Palmer (Auk, ii, 304), and a very typical male was taken at Beltsville on May 1, '95, by A. H. Thayer (C. W. Richmond, Auk, xii, 307).

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Helminthophila chrysoptera (642). Golden-winged Warbler.

Uncommon migrant; on May 7, '92 (Pleasants), one was taken and several others seen near Towson. On May 29, '92 (Wholey), one at Waverly, and on September 5, '93 (Gray), another near Franklintown. At Laurel a female was taken on May 8, '94, by Geo. Marshall. At Washington "one was seen on May 2, '90, and specimens were taken on May 4, '88 (Hasbrouck), and '90 (Figgins); on August 8, '89; on August 11, '89 (Palmer); and a pair on August 17, '89. There are numerous other records" (Richmond). On Dan's Mountain I noted one on June 10, '95.

Helminthophila ruficapilla (645). Nashville Warbler.

Regular, though not common migrant. On May 6, '93, and 7, '92 (Pleasants), single birds were taken near Towson. On May 11, '92 (Wholey), 3 birds were shot out of about 20 at Waverly, where on the 12th they were still more numerous; at the same place they were very numerous on May 14, '93, but 3 days later only one was noted. One was taken at Towson on September 18, '93 (Pleasants). At Washington "specimens were taken on May 1, '89 (R. Ridgway); May 3, '88 (A. K. Fisher); May 13, '82 (H. M. Smith); September 5, '82 (H. M. Smith); September 16, '94 (Figgins); and September 18, '90, etc." (Richmond).

Helminthophila celata (646). Orange-crowned Warbler.

"Migrates sparingly east of the Alleghanies" (Manual, 488). On October 12, '89, one was taken at Munson Hill, Va., a few miles from Washington, by Dr. A. K. Fisher (Auk, vii, 96), and Captain Crumb shot one at Cobb's Island in the fall of '87 (letter to W. H. Fisher). "Wm. Palmer shot one on October 14, '94, at Kensington, Md. This is the latest warbler to arrive, all eastern North American dates are very late, compared with those of the other warblers. In spring it should be looked for in March" (Richmond).

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Helminthophila peregrina (647). Tennessee Warbler.

Irregular fall migrant, has not yet been noted in spring. Specimens have been taken near Baltimore on September 18 ('93, Gray) and September 20 ('93, Pleasants). "At Washington, on August 31 ('90, Figgins; W. L. Richmond); September 28 ('82, Palmer; '90); September 29 ('89, Figgins); October 3 ('94, Palmer); October 11 ('61, T. C. Smith); October 12 ('90); November 30 ('89), and others are recorded. Some seasons it is not rare in the tall, rank growth of weeds on the Potomac Flats" (Richmond).

Compsothlypis americana (648). Parula Warbler.

A common migrant, this species also spends the summer with us in numbers, where it finds the hanging moss (*Usnea*), and occasionally elsewhere. First noted near Baltimore on April 25 ('91, Gray), it was common on May 4 ('93, Fisher) and began to thin out by May 17 ('92, Wholey). The first fall movement was noted on August 21 ('94), and it was numerous from September 12 ('90, Gray) to October 8 ('92, Gray), the latest date being October 17 ('88, Resler). At Washington it "was first noted on April 19 ('91), and common on April 28 ('89); the last was recorded on October 16 ('87)" (Richmond).

During summer, noted near Baltimore on June 3 ('91, Resler), June 8 and 30 ('93, Wholey), July 4 and 14 ('93 Gray) and July 29 and August 5 ('92, Resler). At Washington on June 10 ('86, Richmond).

On the Isle of Wight, Worcester County, a few miles north of Ocean City, Md., on June 8, '94, I saw a pair feeding four flying young; this prompted further investigation, and on the 12th I found them very numerous, in the 4 hours I spent there, noting at least 50 pairs of adults with young, each brood keeping separate.

On Dan's Mountain I noted a female on June 5, '95, the only one seen there.

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Dendroica tigrina (650). Cape May Warbler.

I have only records of 2 specimens taken near Baltimore, one on October 21 ('93, Wholey) at Waverly, the other on October 22 ('90, Resler) at Back River. "Not by any means rare in the District of Columbia, some seasons quite common; quite a number of specimens are on record between May 8 ('89, R. Ridgway) and May 16 ('89, R. Ridgway). On August 4, '92 (E. J. Brown), one was taken and they are again numerously recorded from August 25 ('90, Figgins) to October 7 ('82, H. M. Smith), while on December 16, '88 (Figgins), an adult male was shot; it was in company with *D. coronata* and was in good health and spirits when found" (Richmond).

Dendroica æstiva (652). Yellow Warbler.

Scattered everywhere in migrations, and locally common during summer. On April 6 ('93, R. C. Watters) quite a number were seen and one shot in Dorchester County. April 15 ('95, Wm. Palmer), at Washington; April 21 ('83 Small), at Hagerstown, and April 24 ('89, Resler), are first dates. They soon become numerous, but thin out by May 11 ('92). In the fall I have never seen them so numerous as they are in spring, generally only a single bird being seen at a time, the last on October 2 ('94). Nests with eggs are recorded from May 15 ('95, Gray) to June 16 ('95). Sets are 3 of 3, 1 of 4, and 1 of 5. Common at Vale Summit, June 5–14, '95.

Dendroica cærulescens (654). Black-throated Blue Warbler.

An abundant migrant, noted as numerous from April 30 ('93) to May 15 ('92); the last were seen on May 28 ('94), when a pair, male and female, spent the day at Waverly, Baltimore City. August 27 ('89, Resler) notes the first return in the fall and they were numerous from August 31 ('93 Gray) to October 18 ('93), when an enormous number were in a small patch of woods. At Washington, "from April 27 ('88, Hasbrouck) to May 30 '88), and from August 31 ('90) to October 19 ('92)" (Richmond).

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Dendroica coronata (655). Myrtle Warbler.

Abundant migrant, some occasionally wintering with us. On September 7, '94, a single bird was seen in Druid Hill Park. On September 30 ('94) the migration commenced and they are numerously noted to November 12 ('92, Gray); after which they were recorded on November 24 ('92), December 28 ('91, Gray) and January 28 ('93, Gray), becoming common again on February 4 ('93, Gray) and remaining so until May 5 ('95), the latest date being May 19 ('93, Resler). At Washington, it is "a common winter resident from September 30 ('90; '94) to May 20 ('88)" (Richmond). At Hagerstown, "plentiful in November and February, many spent the winter of '79–80, while other winters only a few were seen. In '83 they remained in considerable numbers until May 6" (Small).

During the latter part of June, '79, a male, female and 3 young about half grown were observed near Havre-de-Grace. The male was perfectly healthy, but the female had a healed up broken wing and was only able to flutter a short distance, which accounts for their staying to breed (Ludwig Kumlein, B. N. O. C., v. 182.)

Dendroica maculosa (657). Magnolia Warbler.

Abundant migrant; noted from May 4 ('93, Fisher) to June 3 ('94, Gray), and from August 22 ('94), to October 5 ('87, Resler). At Washington "from April 22 ('91) to May 30 ('91), and from August 16 ('89) to October 5 ('90)" (Richmond). "The nest has been found in Somerset County, Pa., where I am informed they breed regularly" (Birds Pa., 283).

Dendroica cærulea (658). Cerulean Warbler.

Rare east of the Alleghanies. On July 14, '93, an adult male and 2 young birds were taken; the male had been heard singing for a week previously (J. H. Pleasants, Jr., Auk, x, 372). On May 5, '88, a male was taken at Rock Creek, and on May 11, '90, a female on the Virginia side of the Potomac near Washington (E. M. Hasbrouck, Auk, v, 323 and vii, 291).

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At Hagerstown it was noted as a rare transient and questioned as a summer resident (Small), while Dr. H. D. Mearns gives it as "a rare summer visitant" in Somerset County Pa., (Birds Pa., 269 and 284).

Dendroica pensylvanica (659). Chestnut-sided Warbler.

A common migrant from April 29 ('93, Gray) to May 25 ('92, Resler), and from August 15 ('90, Pleasants) to September 25 ('93, Gray). On October 18, '93, a remarkably large number of this species were observed. They, with other species, fairly swarmed in an 8-acre piece of woods; my note book says: "The ground was covered with Towhees and Snowbirds, the bushes were full of White-throats, Song Sparrows and Snowbirds, while the trees were filled with Black-throated Blue, Black-throated Green, and Chestnut-sided Warblers, Golden and Ruby-crowned Ringlets, Robins and Blue Jays,—evidently a first-class bird-wave."

At Washington they are recorded from "April 28 to May 30 ('91), and from August 10 ('89; '94, Figgins) to September 29 ('89)" (Richmond).

On July 4, '93 (Wholey), a pair were taken near the Blue Mountain House, and on July 24, '93 (Gray), a pair with "worms" in their bills were seen within 100 yards of High Rock, showing that they breed on the Blue Ridge. On Dan's Mountain they were fairly common from June 5 to 14, '95; on the 9th I collected a nest with 4 eggs about half incubated.

Dendroica castanea (660). Bay-breasted Warbler.

Migrant, not common; specimens have been taken as follows: May 16 ('91, Blogg) at Franklintown, May 21 ('93, Wholey) at Waverly, May 24 ('90, Pleasants) at Towson, and May 28 ('93, Wholey) at Waverly; September 20 ('93, Gray) at Calverton, September 21 ('93, Pleasants) at Towson, and September 28 ('89, Resler) at Back River.

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At Washington "a late arrival in spring of irregular abundance, usually uncommon; from May 10 to 27 ('88; 5 shot by Wm. Palmer), and from August 29 ('87, R. Ridgway) to October 19 ('88, R. Ridgway). On September 22, 24 and 29, '89, they were common at Great Falls, Md." (Richmond).

Dendroica striata (661). Black-poll Warbler.

Common migrant from May 4 ('92, Resler) to May 28 ('87, Resler; '93, Wholey), and from September 24 ('84, Resler) to October 18 ('90, Resler). At Sandy Springs, to June 3 (Stabler). At Washington "numerous from May 1 to June 1 ('88, '89, and '90, Figgins; '91), and from September 1 ('89 and '94, Figgins) to October 20 ('89) One was seen on June 3, '89; one was shot on June 4, '58, (Coues), and one was heard singing on June 12, '94 (Brown)" (Richmond). "On July 30, '93, an adult male was shot at Washington (E. J. Brown, Auk, xi, 79).

Dendroica blackburniæ (662). Blackburnian Warbler.

Common migrant from May 2 ('93, A. Wolle) to May 19 ('92, Resler), and from August 30 ('93, Gray) to October 13 ('83, Resler). At Washington "as early as August 19 ('94, Brown)" (Richmond). On July 28, '92, in Howard County, a young male was taken by A. Resler (Transactions of the Maryland Academy of Sciences, 1892, 203). On June 10, 95, on Dan's Mountain, while watching a pair of Louisiana Water Thrushes, a male flew close to me and commenced bathing.

Dendroica dominica (663). Yellow-throated Warbler.

"Southern Atlantic States, north regularly to Maryland (near seacost)" (Manual, 503). On May 12, '95, at Fairwiew, a fishing shore on Rock Creek, Anne Arrundel County, and 9 miles from Baltimore, Mr. W. H. Fisher noted 3 birds of this species; two were together in the woods, the third was in a tree at the boat-landing.

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"At Washington it is not common; specimens have been taken as follows: July 15, '94, 3 (Brown and Palmer); July 20, '90, 3 or 4 (Figgins and Richmond); July 27, '90, 1; July 28, '89, 4 (Figgins and Richmond); July 29, '94, 1 (Brown and Palmer); August 1, '89, 5; August 1, '94, 4 (Figgins); August 5, '89, 1; September 4, '90, 1 seen. In '93, at Johnson's Gully, near Marshall Hall, Md., where it undoubtedly breeds, Palmer and Hasbrouck found it on June 1 and 11, July 22 and August 10. On Smith's Island, Va., about May 24, '94, I saw one with a 'worm' in its mouth, evidently feeding young" (Richmond).

Dendroica virens (667). **Black-throated Green Warbler.**

Common migrant from April 21 ('93, Blogg) to May 15 ('92), and from August 30 ('90, Resler) to October 22 ('90, Pleasants). On October 18, '93, they were remarkably numerous in the bird wave already noted. At Washington from April 22 ('88, M. M. Green) to May 19 ('88; '95, Palmer), and from August 26 ('89, Figgins, at Jefferson, Md.) to October 21" (Richmond). On June 14, '95, on Dan's Mountain, a pair were feeding flying young.

Dendroica kirtlandi (670). **Kirtland's Warbler.**

Migrates through southeastern United States and Mississippi Valley; summer home unknown, winters in the Bahamas. "Wm. Palmer shot one on September 25, '87, near Fort Myer, Va. (about one-quarter mile from the Potomac River)" (Richmond).

Dendroica vigorsii (671). **Pine Warbler.**

Fairly numerous during migrations, this species, local in its distribution, spends the summer with us in limited numbers. Numerously noted from April 9 ('90, Resler) to April 25 ('85, Resler), and from August 3 ('93, Resler) to October 22 ('92, Blogg). On June 29, '93 (Resler), one was taken at Back River, and on July 2, '93, another in Dulaney's Valley. At

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Washington "noted from March 24 ('89, Figgins) to October 25; it is a rare summer resident but swarms at times in the fall. Figgins found them in immense numbers on August 31, '90, and shot 18" (Richmond).

In Dorchester County, on April 6, '93 (R. C. Watters), several were seen and one taken. In Worcester County, on June 12, '94, on the mainland, about a mile from Ocean City, I watched a male for about an hour in hopes of locating the nest which evidently was close at hand, but I did not find it.

Dendroica palmarum (672). Palm Warbler.

"Occasional (or casual) during migrations east of the Alleghanies" (Manual, 517). The following specimens have been taken near Washington, where it is "probably a regular, though rare, migrant." April 22,' 85, Roslyn, Alexandria County, Va.; April 29, '88, Roslyn, (C. W. Richmond); May 6 and May 11, '89, Laurel, Prince George County, Md. (R. Ridgway); May 11, '90, Riverdale, Prince George County, Md. (C. W. Richmond); May 11, '81, Soldiers' Home, District of Columbia (L. M. McCormick); September 18, '87, Potomac Landing, Alexandria County, Va.; September 22, '93, Four Mill Run, Alexandria County, Va. (J. E. Brown); October 4, '91, Ballston, Alexandria County, Va. (Wm. Palmer, Auk, xi, 333).

Dendroica palmarum hypochrysea (672*a*), Yellow Palm Warbler.

A regular migrant; common, usually appearing in small flocks, though often single birds are seen, from April 4 ('93, Gray) to April 29 ('91, Resler), and from September 12 ('95, Hoen) to October 22 ('93). At Washington "from March 31 ('89) to April 29, and in the fall they were still common on October 19 ('90, Figgins)" (Richmond). "One year they were very common at Hagerstown in October, swarming everywhere, some even coming in at the windows" (Small).

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Dendroica discolor (673). **Prairie Warbler.**

A summer resident, but so decidedy local that until its special haunts are discovered its presence is not suspected. These are usually of limited extent, but quite a number are known near Baltimore, a few pairs breeding at each. Noted from April 22 ('91, Resler) to September 5 ('83, Resler). On June 4 ('90, J. H. Fisher, Jr.) a nest held slightly incubated eggs, and on July 16 (93) young birds left a nest on being disturbed. Sets are 3 of 3, and 1 of 4. "Common at Washington from April 19 ('91) to September. Mr. Figgins found a nest with 4 eggs on May 14, '91, and another with 3 on May 30, '88" (Richmond).

Seiurus aurocapillus (674). **Oven-bird.**

Common summer resident; first noted on April 9 ('93), and numerous from April 21 ('93, Resler) to September 16 ('94); the last was recorded on October 18 ('90, Resler). Extreme nesting dates are May 24 ('91, J. H. Fisher, Jr.), fresh eggs, and August 6 ('93), young just out of the nest. Sets are 2 of 3, 7 of 4, and 1 of 5. At Washington "to October 17, '90; on May 20, '88, a nest with 4 eggs was found" (Richmond).

Seiurus noveboracensis (675). **Water-Thrush.**

Common migrant from April 27 ('92, Resler) to May 25 ('93, Resler), and from August 29 ('94, Resler) to October 16 ('92, Wholey). At Washington "from April 22 ('94, Wm. Palmer) to May 25. On July 21 ('94, Figgins) one was found that had killed itself by flying against telegraph wires, and it is numerously recorded from that on until September" (Richmond).

Seiurus noveboracensis notabilis (675*a*). **Grinnell's Water-Thrush.**

A western species. Two specimens taken in Virginia, near Washington, May 11, '79, and May 5, '85, are in the collection of Mr. W. Palmer (Auk, v, 148). Another was captured

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by Dr. A. K. Fisher, August 5, '86, not far from the Long Bridge, on the Virginia side of the Potomac" (Birds Vas., '85–6.)

Seiurus motacilla (676). Louisiana Water-Thrush.

Common during migrations. This species probably spends the summer with us in greater numbers than is generally supposed. Noted from April 3 ('93, Gray) to September 24 ('92, Blogg). On June 13 and 22, '93 (Gray), a pair were seen feeding young near Franklintown. At Washington "a nest and 5 badly incubated eggs were obtained on Piney Branch, May 25, '88, by G. E. Mitchell. Wm. Palmer got a fully fledged young bird about June 14, '91" (Richmond). On June 10, '95, I found two pairs on Dan's Mountain, where, no doubt, they were nesting.

Geothlypis formosa (677). Kentucky Warbler.

Summer resident, not rare round Baltimore; a pair usually occupying each marshy spring head in heavy woods. Noted from April 29 ('92, Blogg) to September 8 ('95); nesting dates range from June 18 ('93), young just hatched, to July 27 ('95), young still in nest. Sets are 1 of 3 and 4 of 4. At Washington "not very common, May 3 to September 5. On June 15, '79, Mr. H. W. Henshaw found a nest with 4 eggs somewhat incubated" (Richmond). At Johnson's Gully, Md., on May 30, '92, a nest with 5 eggs was found, and on June 6, '29, another with 4 eggs, both slightly incubated (E. M. Hasbrouck, Auk, x, 92).

Geothlypis agilis (678). Connecticut Warbler.

A rare migrant. I have no spring dates, but specimens have been taken from September 20 ('93, Pleasants) to October 1 ('90, Resler). At Washington "very rare in spring. Mr. L. McCormick shot one at Falls Church, Va., in May, '79, and Wm. Palmer got a female on May 23, '91. It is fairly common in fall, and has been taken from August 28 ('86, Dr. A. K. Fisher) to October 12 ('90), when two were taken on the Potomac Flats and another seen" (Richmond).

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Geothlypis philadelphia (679). Mourning Warbler.

Rare migrant; near Baltimore single birds have been recorded as follows: May 28, '91, Towson (Pleasants), shot; May 26, '77, Back River (Resler), shot; June 3, '93, Franklin Road (Gray), seen; August 24, '87, Patapsco Marsh (Resler), shot; August 30, '93, Back River (Resler), shot; September 1, '90, Franklin Road (Blogg), seen; September 13, '79, Bay View (Resler), shot; September 18, 93, Franklin Road (Gray), seen; September 26, '94, Back River (Resler), shot; September 30, '93, Dulaney's Valley (Wholey), shot; October 5, '87, Patapsco Marsh (Resler), shot.

On August 17, '94, an immature female was taken at Laurel, by Mr. Geo. Marshall. At Washington "very rare from the middle to the end of May and from August to October 1, '94, when Wm. Palmer got an immature female" (Richmond).

Geothlypis trichas (681). Maryland Yellow-throat.

Our most abundant summer warbler; first noted on April 20 ('91, Resler), it soon becomes common and remains so until October 6 ('95), the last being recorded on October 19 ('92, Resler). The nests of this species, as of all ground buildings birds, are difficult to find, so I have but few items; extremes are May 24 ('92, Wholey), a nest ready for eggs, and August 13 ('93), when young leave a nest. Sets are 1 of 3, and 2 of 4. At Washington "abundant from April 15 ('91, R. Ridgway) to October 21 ('95, Palmer and Matthews)" (Richmond). Not very common on Dan's Mountain, June 5–14, '95.

Icteria virens (683). Yellow-breasted Chat.

Common summer resident, from April 30 ('92, Gray); they leave early and but few are seen after August 6 ('93), though single birds have been noted until August 30 ('93, Gray). At Washington "from April 29 ('74, Palmer, Hasbrouck and Preble; '88, Hasbrouck) to September" (Richmond). It is given to September 20 in Pennsylvania (Birds Pa., 299). Eggs

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are noted from May 22 ('89, J. H. Fisher, Jr.) to July 12 ('91). Sets are 9 of 3, 2 of 4, and 1 of 5. A few pairs were on Dan's Mountain; a nest contained 3 eggs on June 14, '95.

Sylvania mitrata (684). Hooded Warbler.

A rare migrant; near Baltimore specimens have been taken: May 3, '90, and 10, '84 (Resler); May 15, '92 (Wholey); September 8, '93 (Gray); September 20, '90 (Resler), and one was seen on September 22, '95. Possibly it breeds in limited numbers in Howard County, for on August 4, '94, near Botterill P. O., 14 miles southwest of Baltimore, Mr. A. Resler collected a young bird not long out of the nest, and four days later a pair of adults, male and female. At Washington "a rare migrant, may breed. Specimens have been taken from May 1 ('88, Hasbrouck) to the end of the month; and from August 19 ('94, Figgins), at Kinsington, to September 15 ('90)" (Richmond).

Sylvania pusilla (685). Wilson's Warbler.

A fairly common migrant from May 6 ('93, Gray) to May 26 ('95), and from September 11 ('92, Gray) to September 23 ('93, Wholey). At Washington "rather common from May 8 to May 23 ('91), and from August 31 ('90) to the middle of September" (Richmond).

Sylvania canadensis (686). Canadian Warbler.

Common migrant from May 4 ('95, Fisher) to May 29 ('94, Resler), and from August 7 ('89, Resler) to September 18 ('90, Gray). At Washington "from May 5 ('94, Hasbrouck) to May 27, and from August 7 ('87) to September 24 ('89)" (Richmond). On Dan's Mountain, on June 10, '95, I came across a male singing, and later a pair with young in the nest.

Setophaga ruticilla (687). American Redstart.

Common migrant from April 25 ('91, Blogg) to May 24 ('93, Wholey), and from August 24 ('94) to October 15 ('93); most of the notes, after the middle of September, record imma-

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ture birds. It is also fairly common, though local, during the summer. A pair were seen mating on May 15 ('92), and young birds out of the nest are noted from June 3 to July 18 ('93, Gray). On June 20, '93, Mr. W. H. Fisher and I found them very numerous at Mount Washington. In a walk of about three-fourths of a mile we noted 9 pairs feeding young, and no doubt there were others we did not see. Sets are 3 of 3. At Washington it is "a common migrant, first noted on April 19, '91. A few breed. Hasbrouck found a nest with 4 eggs nearly hatched on May 21, '88" (Richmond). On Dan's Mountain, June 5 to 14, '95, they were very numerous; their numbers about equalled that of all other birds seen there. On the 9th young birds left a nest before I could count them.

Family MOTACILLIDÆ—Pipits.

Anthus pensilvanicus (697). American Pipit.

Common in flocks from October 13 ('95) to November 19 ('94), and from February 11 ('94) to May 13 ('92); occasionally some winter with us. At Washington "from October 15 ('90) to May 4 ('89); more numerous in October, November and March and April than in midwinter. They were common until November 30, 90" (Richmond).

On November 12, '93, I found a large flock in Dulaney's Valley; some were running and presumably feeding on pasture, others on a part that had been newly turned up, while the greater number were either bathing in a shallow puddle or dressing their feathers in an adjoining tree, being perched on the branches from the ground up to the top, fully 50 feet from the ground; they, however, were more at home on the fence rails or on the ground.

Family TROGLODYTIDÆ—Thrashers, Wrens, etc.

Mimus polyglottos (703). Mockingbird.

Resident in the southern counties of Maryland and regular in summer as far north as Kent and Anne Arundel Counties. In

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the balance of the state it can only be called a straggler. On May 2, '93 (Fisher), one was at Glyndon. On June 7 and 14, '85, one was singing in great style at Fork. On September 17, '93, two were fussing in a tree in Dulaney's Valley, where Mr. Thomas Peerce informs me a pair "used" until a few years ago, and also that another pair regularly spent the summer just across the ridge in Long Green Valley, until about the same year. In the spring of '82 (Pleasants) two nests with eggs were found near Towson.

On June 28, '93 (Blogg), a nest with young about a week old was found at Bay Ridge, Anne Arundel County. In Queen Anne County, on May 30, '92, a nest was ready for eggs, and on May 27 and 31, and June 1 and 2, nests were found with 3 young birds in each. At St. Michael's, Talbot County, 4 fresh eggs were found on June 13, '94.

Galeoscoptes carolinensis (704). Catbird.

Common summer resident from April 25 ('92, Gray) to October 22 ('90, Resler). One was noted in Dulaney's Valley on December 24 ('94, W. L'Allemand), and on April 2 ('93) two very noisy birds spent the day at Waverly. At Washington "from April 16 ('94, R. Ridgway) to October; Wm. Palmer has taken a specimen in December, and on January 13, '89, I found the remains of one that had been killed by some bird of prey" (Richmond). On May 4 ('92) a pair were building, and eggs are recorded from May 16 ('91) to August 16 ('91). Sets are 1 of 1, 6 of 2, 31 of 3, 15 of 4, and 2 of 5. At Vale Summit, I only saw 3 in 10 days.

The following is the result of observations made on a nest built in a veranda at Tacoma, D. C. After the nest had been completed 24 hours, the first egg was laid on May 11, '93, at 10.35 A. M., the second at 9.40 A. M., the third at 9.15 A. M., and the fourth at 10.15 A. M. on successive days. For the first 4 days she sat upon them only at irregular intervals, but this habit soon changed after that time. On May 25 there were no birds hatched at dark, but on the morning of the

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26th 3 young were in the nest, the other hatched the next night. At 6.45 P. M. on June 5 they all left the nest together (R. W. Shufeldt, Auk, x, 303–4).

Harporhynchus rufus (705). **Brown Thrasher.**

Common summer resident, from April 19 ('94) to September 21 ('94); extreme dates are April 7 ('90, Resler) and November 5 ('93). "At Laurel, on April 2 ('88, R. Ridgway), two were seen. At Washington from April 6 ('88) to November 13 ('87)" (Richmond). May 21 ('93), a nest with birds about one-half grown, and August 6 ('93), another with birds only 3 or 4 days old, are extreme nesting dates. Sets are 2 of 2, 4 of 3, 5 of 4, and 1 of 5. Usually nesting in a brier tangle or thick bush, on May 29, '81, one was placed on the broken-off top of an appletree stub about 7 feet high. On July 26, '91, one was on the 4th rail of a worm fence, and on June 24, '91, another was on the ground under a potato vine. At Vale Summit they were not common; on June 7 a nest held 4 fresh eggs.

Thryothorus ludovicianus (718). **Carolina Wren.**

Common resident, occasionally vying with the House Wren in semi-domesticity. On April 8 ('94) a nest was nearly finished, and on May 2 ('90) a brood of young left a nest, while as late as August 10 ('93) slightly incubated eggs were taken. Sets are 1 of 3, 1 of 4, 2 of 5, and 2 of 6.

On April 26, '91, I was shown a nest containing 3 fresh eggs placed behind an ornament in the corner of a friend's parlor; later, I was told that either five or six young were raised there. At Vale Summit one bird was seen on June 13, '95.

Thryothorus bewickii (719). **Bewick's Wren.**

A rare bird east of the Alleghanies. Single birds are recorded at Washington as follows: April 5, '92 (R. Ridgway), seen; April 6, '83 (Wm. Palmer), shot; April 8, '88 (M. M. Green), shot; April 10, '82 (Wm. Palmer), shot; April 22, '88 (M. M. Green), seen; November 24, '89 (J. D. Figgins), shot; Decem-

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ber 22, '90 (C. W. Richmond), seen (Robt. Ridgway, Auk, ix, 307, and Richmond). Possibly it is common in summer in parts of western Maryland. On July 4, '93 (Wholey), about one hundred yards from Quir-Auk, on the Blue Ridge Mountain, a nest of this species was found in a hollow log; in it were 4 young, which fluttered out, leaving 2 infertile eggs. On the same day a specimen was secured near the Blue Mountain House. On August 2, '93 (Gray), one was observed near Hagerstown. On June 9 and 14, '95, I noted this species at Vale Summit, and on the 11th a pair were seen with a brood of young.

Troglodytes aëdon (721). House Wren.

A common summer resident. This semi-domesticated, wholly independent and irrepressibly impudent little bird has been noted from April 12 ('95, Fisher) to October 10 ('93), on which latter date a number were seen at Bright Lights, near North Point. Possibly they may arrive earlier than above given, for on April 27 ('93) a nest was about one-half built, and 3 days later another was nearly ready for eggs. The earliest date, however, I have found eggs is May 19 ('95), the latest July 17 ('92), and on August 26 ('94) young birds barely out of the nest were seen. Sets are 2 of 3, 3 of 4, 7 of 5, 4 of 6, and 2 of 7.

This species often pre-empts the nests of other birds, the Downy Woodpecker being the most usual victim. On May 26, '94, a Carolina Wren's nest, which I had watched being built, held one egg; on June 3 a House Wren was found it it, and having added 5 of her own was sitting on them, all 6 being slightly incubated. As a rule, when the House Wren jumps a claim it modifies things to suit itself, but in this case it made no changes, the nest being exactly as the Carolina Wren had built it.

Troglodytes hiemalis (722). Winter Wren.

Common winter resident from September 26 ('94, Resler) to May 7 ('93, Blogg, Fisher and F. C. K.). At Washington

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"from September 27 ('89, R. Ridgway) to April 29 ('88)" (Richmond). While a few come round the farm buildings, others may be found in dry upland woods, but to see any number in the course of a day's walk, our wooded watercourses must be followed, where they will usually be found among the roots that hang from the washed banks, the individuals being about one-half a mile apart. On November 27, '92, Mr. W. N. Wholey and I heard one sing in Dulaney's Valley.

Cistothorus stellaris (724). Short-billed Marsh Wren.

Very rare. On April 18, '79, a specimen was presented to the Maryland Academy of Sciences by Mr. W. S. Clayton. Presumably it was taken in the vicinity of Baltimore. At Washington E. M. Hasbrouck has taken two specimens; one, a female, on May 9, '90 (Auk, vii, 289), the other on May 3, '93 (Richmond). "Rare migrant, and in southern New Jersey occasional (regular?) winter resident" (Birds E. Pa. and N. J., 144; Auk, ix, 204).

Cistothorus palustris (725). Long-billed Marsh Wren.

Common summer resident in the marshes of tidewater Maryland; it probably also winters in limited numbers in southern Maryland, as Messrs. S. N. Rhoads and Witmer Stone found it "tolerably common in cattail swamps" at Cape May City, N. J., January 26 to 29, '92, (Auk, ix. 204). Noted near Baltimore from April 28 ('94, Wholey) to October 14 ('91, Resler), and at Washington to October 19 ('90, Richmond). Nests with eggs range from June 3 ('90) to August 7 ('90), on which latter date 3 other nests were ready for eggs, so presumably they nest later. Sets are 1 of 2, 1 of 3, 9 of 4, 6 of 5, and 1 of 6. At Hagerstown one was observed "for a few days in spring in the yard" (Small).

Family CERTHIIDÆ—Creepers.

Certhia familiaris americana (726). Brown Creeper.

Fairly common during winter from September 26 ('94, Resler) to May 8 ('75, Resler). "One was taken at Washington

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on September 22, '55, by Dr. Coues" (Richmond). On September 27 ('94, Fisher) one was seen in a tree at the corner of Park Avenue and Madison Street. At Hagerstown "from October to May" (Small).

Family PARIDÆ—Nuthatches and Tits.

Sitta carolinensis (727). White-breasted Nuthatch.

Common resident, but usually seen singly or in pairs. On March 31 ('94, Blogg) a pair were found building, and on April 7 the nest contained 1 egg. On July 26 ('94) young just out of the nest were observed.

On June 11, '95, a single bird was noted on Dan's Mountain, and on July 6 ('95, Tylor), a pair were feeding young at Deer Park.

Sitta canadensis (728). Red-breasted Nuthatch.

Common during some winters, this species is either wanting, or very rare during others. During the severe winter of '92–3, they were quite numerous round Baltimore. Usually found singly, at times several may be seen fairly close together. September 11 ('80, Resler) and May 6 ('93, Gray), are extreme dates; on this last day they were quite numerous and a number of specimens were taken. At Washington to May 10 (Richmond), and at Hagerstown to May 4 (Small).

Sitta pusilla (729). Brown-headed Nuthatch.

Apparently a regular summer resident in southern Maryland. On May 28, 92, in Queen Anne County, I found a pair building a nest in a small hole in a dead pine stub, and later in the day, about three-quarters of a mile distant, I came across another pair. In Worcester County on the mainland, about a mile from Ocean City, on June 8, '94, I found a single bird.

"It is common at St. George's Island and Piney Point, Md., near the mouth of the Potomac, and on Smith's Island, Va. Between Cape Charles and Brighton it was noted in small numbers and is probably common" (Richmond).

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Parus bicolor (731). **Tufted Titmouse.**

Common resident. On April 10 ('92) a nest was ready for eggs, and on August 4 ('94) young not long out of the nest, keeping in a close bunch and still being fed, were seen. Sets are 1 of 5 and 1 of 8. "Their notes are heard loudest on clear winter days, and at Hagerstown they are locally called 'Storm Bird'" (Small). On Dan's Mountain I noted single birds on June 11 and 12, '95.

Parus atricapillus (735). **Chickadee.**

Irregular winter visitant, sometimes common in cold seasons ('92–3 for instance), when the majority of the following species leave us. Noted from October 15 ('92; '93) to March 21 ('95).

"Mr. Henry Marshall has taken it at Laurel" (A. C., 37). "This bird was very abundant about Washington during March and April, '85. . . . Owing probably to the severe winter they were driven south, returning about the middle of March; the first specimens were taken March 15, and others were taken every week until April 19, when 6 were shot and many others seen. The weather during April was fine and warm, and the birds were singing and apparently quite at home. But few *P. carolinensis* were seen until the last week of April, showing that they too had been driven much further south" (Wm. Palmer, Auk, ii, 304). Noted at Hagerstown as "common during the winter of '80–81"; none, however, were seen the previous or the two succeeding seasons (Small).

Parus carolinensis (736). **Carolina Chickadee.**

Common resident. On April 23 ('93) a nest held 2 fresh eggs, and on July 23 ('93) young, not long out of the nest, were seen. Sets are 2 of 2, 1 of 3, 2 of 4, 1 of 5, 1 of 6, and 2 of 7.

At Hagerstown "resident, but scarce in summer" (Small). On Dan's Mountain, June 6, '95, young were in the nest of the only pair seen.

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Family SYLVIIDÆ—Kinglets and Gnatcatchers.

Regulus satrapa (748). Golden-crowned Kinglet.

Winter resident; very common during some seasons ('92–3, for instance) and comparatively rare others. They are, however, most numerous during migrations, thinning out about the end of October and getting numerous early in March. Extreme dates are September 30 ('93, Gray) and April 22 ('93, Gray). At Washington "one was taken on April 27 ('88, Hasbrouck)" (Richmond), and at Hagerstown it was noted as "staying until May" (Small).

Regulus calendula (749). Ruby-crowned Kinglet.

A common migrant; possibly a few winter with us during mild seasons. Noted from September 26 ('94, Resler) to November 5 ('92, Gray), and from April 2 ('87, Resler) to May 7 ('93). At Hagerstown, a "common migrant in March and April, October and November; plentiful in fall, but scarce in spring" (Small). At Washington "from September 25 ('87) to early in November, and from April 8 ('88) to May 10 ('91). Specimens have been taken in winter: two on December 1 ('89, C. W. Richmond; A. K. Fisher), one on December 15, '89, and 2 others seen, and 1 on February 9 (91, Figgins)" (Richmond). "On December 5, 92, I saw and positively identified a single Ruby-crowned Kinglet in the grounds of the Department of Agriculture, and also saw what was presumably the same individual on January 5, 6 and 14, '93, this period covering some of the most severe weather ever known here" (E. W. Clyde Todd, Auk, x, 206).

Polioptila cærulea (751). Blue-gray Gnatcatcher.

Fairly common during summer in restricted localities, from April 1 ('93, Gray) to September 14 ('93, Gray). At Washington "from April 5 to September; one was shot on November 23, '90" (Richmond). On May 7 ('93), a nest was nearly finished; May 14 ('93, Blogg) and June 4 ('95, Fisher) are extremes for eggs. Sets are 7 of 4.

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On June 12, '94, on the Isle of Wight, near Ocean City, I saw two pairs with young just out of the nests.

Family TURDIDÆ—Thrushes, Bluebirds, etc.

Turdus mustelinus (755). Wood Thrush.

Common resident from April 29 ('93; '94) to October 2 ('95). Extreme dates are April 13 ('92) and October 15 ('93). At Washington "several were seen on April 19, '91, and they were common the next day" (Richmond). At Vale Summit they were fairly numerous, June 5 to 14, '95.

Eggs are recorded from May 18 ('91; '95) to July 28 ('95). Sets are 1 of 1, 18 of 2, 30 of 3, and 16 of 4.

Turdus fuscescens (756). Wilson's Thrush.

Fairly common migrant, from April 23 ('93, Fisher) to May 30 ('92, Blogg) and from August 29 ('93, Gray) to October 6 ('94). At Washington "from April 26 to May 28, and from August 18 ('89, Figgins) to the end of September" (Richmond). At Hagerstown it was noted in October ('79, Small). On July 6, '95 (Tylor), a pair were feeding young at Deer Park.

Turdus aliciæ (757). Gray-cheeked Thrush.

Regular, but not very common migrant, from May 12 ('92, Wholey) to May 30 ('92, Resler), and from September 12 ('94, Resler) to October 16 ('92, Wholey). At Washington "rather common from May 10 to June 5, and from September 10 to October 10" (Richmond).

Turdus aliciæ bicknelli (757*a*). Bicknell's Thrush.

Apparently a rare migrant. "At Laurel Mr. Robert Ridgway shot an adult male on May 14, '88, and 4 days later an adult female; near Washington on October 3, '85, I secured an adult male" (Richmond).

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Turdus ustulatus swainsonii (758*a*). Olive-backed Thrush.

Common migrant from April 30 ('92, Wholey) to May 28 ('93, Wholey), and from September 16 (92, Pleasants) to October 13 ('94). At Washington "until Oct. 20, '90" (Richmond).

Turdus aonalaschkæ pallasii (759*b*). Hermit Thrush.

A common migrant from October 4 ('94) to November 28 ('91, Resler), and from March 23 ('89, Resler; 94, Fisher) to May 21 ('92, Gray). It also stays with us sparingly during winter, single birds being taken as follows: December 24, '92 (Wholey); January 1, '92 (Wholey); January 8, '87 (Resler); January 17, '92 (Wholey); January 20, '93 (Gray); January 27, '95 (F. C. K.), 1 seen; January 29, '80 (Resler), 1 seen; February 6, '76 (Resler), 1 seen; February 22, '92 (Gray), 1 seen; and March 5, '90 (Resler). In Somerset County they were common from November 13 to 22, '94 (Fisher). On July 9, '90, an adult female was shot in Howard County, about fifteen miles southwest of Baltimore City, by A. Resler (Forest and Stream, xxxv, 11).

Merula migratoria (761). American Robin.

Resident, abundant in flocks during the migrations, it is commonly scattered over the country during summer, and a few scattered flocks as a rule winter with us in the uplands north of Baltimore, while down the "necks" they are more numerous, and in southern Maryland large flocks are characteristic of the winter season. Eggs are noted from May 5 ('95) to July 30 ('81). Sets are 7 of 3 and 10 of 4. At Hagerstown eggs were also noted on May 5 ('82, Small). Not numerous at Vale Summit, June 5 to 14, '95.

Sialia sialis (766). Bluebird.

Common resident. On March 18 ('94) a nest was ready for eggs, and birds were in another on August 12 ('94). Sets are 2 of 2, 3 of 3, 5 of 4, and 7 of 5.

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In the fall and winter they often go in flocks of 5 or 6 to about 20, but generally they will be seen in pairs. On January 16, '95, Bluebirds were seen at Cumberland, where the rivers and creeks had been frozen over from December 25 (Howard Shriver, Maryland State Weather Service, Report of February, '95). On June 11, '95, a brood of flying young were noted at Vale Summit.

The latter part of the winter of '94–5 was remarkable for its severity all over North America, and the birds were thinned out in great numbers. Perhaps from being more familiarly known than other small birds, the almost complete absence of Bluebirds and Phœbes caused considerable comment. The blizzard of early February completely covered Maryland with 2 feet or more of snow, and travel was stopped for about 10 days by the drifts. Bluebirds had been numerous around Baltimore up to this time, and 2 were still alive on February 10. Later in the season a number of Screech Owl holes were found more or less filled with Bluebird feathers, and the owls were absent. Only a very few scattered Bluebirds were noted during summer and fall until November 3, when my note book says, "scattered everywhere over Dulaney's Valley in pairs, evidently a migration flight"; on November 9 a flock of about 20 was seen. At Washington "21 dead birds were found by Robt. Ridgway in a bird box on his grounds, where they had been frozen by the blizzard which almost exterminated them in this part of the country" (Richmond).

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ADDENDA.

Larus atricilla (*58*), Laughing Gull. About 100 were below Fort McHenry on April 23, '95, and about a dozen were in the lower harbor on October 24, '95.

Hydrochelidon nigra surinamensis (*77*). "The Black Tern at Washington, D. C. September 18, '93 I shot 13 Black Terns. Previous to this I am aware of only one recorded instance of its occurrence, one being found dead September 18, '82. Edward J. Brown" (Auk, xi, 73).

Phalacrocorax dilophus (*120*), Double-crested Cormorant. 7 Cormorants, presumably of this species, were seen at Ocean City on September 23, '94 (Tylor).

Rallus virginianus (*212*), Virginia Rail. Occasional in winter. One was shot near Baltimore, late in December, '79 (Resler), and a male, in full plumage and in fine condition, was taken in a terrapin trap on January 20, '91, near Easton ("Sink-boat", Forest and Stream, xxxvi, 44).

Gallinago delicata (*230*), Wilson's Snipe. On December 29, '94, a female was shot at Westover, Somerset Co., by Mr. M. T. Sudler.

Tringa alpina pacifica (*243a*), Red-backed Sandpiper. Three were at Lock Raven on September 29, '95.

Totanus melanoleucus (*254*), Greater Yellow-legs. On November 13, '75, one was shot at Back River (Resler).

Totanus flavipes (*255*), Yellow-legs. Numerous at Loch Raven from September 22 to October 13, '95.

Bartramia longicauda (*261*), Bartramian Sandpiper. One was shot on September 13, '95, near Relay, by Mr. C. Gamble Lowndes.

Asio accipitrinus (*367*), Short-eared Owl. On November 13, '95 one was shot at Bear Creek, Baltimore Co.

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Coccyzus americanus (*387*), Yellow-billed Cuckoo. One was seen at Pikesville on October 27, '95 (Fisher).

Carpodacus purpureus (*517*), Purple Finch. Should be recorded to May 21 ('92 Gray); not to May 31 ('93 Fisher).

Calcarius lapponicus (*536*), Lapland Longspur. "The blizzard drove half a dozen of these birds into Baltimore City, where on February 4, 5, and 10, '95, they were seen in company with English Sparrows feeding in the bed of North Avenue near Caroline St. They allowed of quite close approach" (Resler).

Ammodramus maritimus (*550*), Seaside Sparrow. "A specimen was collected some 9 or 10 years ago, on Miller's Island, Baltimore Co., by the late Mr. Wolle, Sr., at whose house I had the opportunity to examine the bird before it was mounted" (Resler).

ERRATA.

Page 255, line 24, for Cantter read *Cantler*.
Page 269, line 19, for nivialis read *nivalis*.
Page 270, line 19, for Hutchin's read *Hutchins's*.
Page 274, line 1, for Ardella read *Ardetta*.
Page 275, line 29, for cœrulea read *cærulea*.
Page 277, line 24, for vialaceus read *violaceus*.
Page 281, line 5, for light house read *life-saving station*.
Page 292, line 14, for Black-billed read *Black-bellied*.
Page 301, line 27, for (399) read (*339*).
Page 318, line 31, for (622*a*) read (*466a*).

November 15, 1895.

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CONTRIBUTIONS TOWARDS A KNOWLEDGE OF THE HEMIPTERA-HETEROPTERA OF N. AMERICA.—No. 1.

By P. R. UHLER.

Tetyra robusta, New sp.

Griseus, more or less luteous on the front part of the pronotum, robust, much more rounded than in *T. bipunctata* H. Schf., and with a shorter, less acute head. Surface of the head finely punctate with black, the base with four almost impunctate, callous lines, tylus prominent, projecting a little beyond the lateral lobes, antennæ slender, the basal joint shortest, luteous, black at base and tip, the second and third subequal, a little longer than the first, dark, but blackish on the ends, third and fourth longer than the preceding, nearly equal, blackish; rostrum reaching to near the posterior margin of the second ventral segment, luteous, the apical segment piceous-black. Pronotum strongly convex, wider than long, polished, brownish luteous with a tinge of ash-gray, marked with transverse, curved, broken lines of dark brown; these are crossed lengthwise by other brown lines which run straight on the disk, but become diagonal on the sides. There is a large dark spot back of each eye and two brown, indented dots behind the middle of occipital margin; each side of the anterior lobe is a pair of diagonal, uneven, approximate, luteous spots which are quite smooth, callous and almost impunctate. Directly behind each eye the border is luteous, and luteous vestiges appear next the middle of anterior margin, and with fine, black, distinct punctures spread over most of the surface, the humeral angles blunt, with the lateral margin bluntly diagonal, posterior margin a little concave. Scutellum ample, reaching the extremity of the abdomen, the surface finely and somewhat closely punctate with dark brown. A series of eccentric, wavy, ragged, brown bands crosses the entire scutellum, the

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lines becoming more curved behind. At base, each side of middle, is an indented black dot, and diagonally back from this, on each side, is an oblong, blackish spot. Corium finely flecked with brown, punctate like the scutellum, the membrane brownish. Connexivum both above and below pale or yellowish, having each segment marked with a blackish, large spot. Underside pale luteous, punctate with brown, the hollows of pleural pieces with patches of dark brown, and denser punctures, the submargin of ventor unevenly clouded with brown; each side of middle is a curved, longitudinal line of broad, brown spots. Legs luteous, the femora marked near the tip with a loop of brown spots, tibiæ faintly banded and marked with brown, tarsi mostly brown. Length to end of scutellum 11 to 14 mm. Width of pronotum 8 to 9 mm.

Two specimens from Southwestern Arizona, and a female from Sonora, Mexico, have been examined by me. The yellow spots of the pronotum have been less distinct in the females that I have seen. It is possible that these are varieties of *Tetyra arcuata* Fab., but they are widely different from the insect as described by Fabricius.

Podisus crocatus, New sp.

Broad, suboval, more robust than *P. cynicus* Say, and with blunter and more callous humeral angles. Color dull orange, brighter beneath, coarsely, deeply and unevenly punctate with dark green. Head subquadrate, longer than wide, margined with dark green, often with two dark, short stripes on the basal raised lines, and with a dark streak on the middle of the tylus, reliefs between the eyes strongly defined, lateral lobes somewhat longer than the tylus, more finely punctate than the vertex, their outer angles a little rounded and marked with dark green. Underside of head polished, sparsely and finely punctate in separated patches or lines, the under submargin of the lateral lobes closely and deeply punctate; rostrum reach-

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ing to just behind the middle coxæ, the second joint reaching to the posterior margin of the anterior coxæ; antennæ dusky rufous, darker on middle of last three segments. Pronotum wide, deeply, coarsely punctate, mostly in transverse wavy lines, and punctures partly confluent on the disk, depression at base of forward lobe marked with a transverse series of indented and discolored spots, the posterior lobe more or less darkened with obscure green, the humeral angles irregularly triangular, callous at tip, a little shorter and less acute than in *P. cynicus* Say, the extremity often dark green, and charged with four wrinkles, anterior part of lateral margin coarsely granulate-serrate. Pleural pieces coarsely, remotely, deeply punctate, excepting the area around the ostiolar canal. Legs luteous, sparsely punctate, the femora more or less pointed with rufous, and wrinkled. Scutellum more finely punctate, clouded with green, the middle line smooth and very sparsely punctate. Clavus narrow, dark, luteous, greenish at base, punctate in lines; corium finely and remotely punctate with green, the costal area more coarsely so, and more spotted, membrane longer than the venter, pale bronze, finely granulated, the veins a little darker. Venter coarsely, remotely, unevenly punctate and rugose on the sides, with a broad, smooth, middle line, almost impunctate; tergum purplish black, dull, the connexivum orange, punctate with red, the sutures of the segments broadly marked with a quadrate, black-green, densely punctate spot across the entire width of the connexivum; ventral spur long, acute in the male, blunter in the female. Length to end of venter 13 to 17 mm. Width across humeral angles 8 to 10 mm.

This species is common in Western Oregon and Washington Territories. It occurs also on Vancouver's Island, and extends south into California. The third joint of the

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antennæ is much shorter than the preceding or following ones, the second is longest, and nearly twice as long as the third. The species is very variable in the degree and amount of dark marking on the several parts of the upper surface.

Podisus mucronatus, New sp.

Short, robust, broad-suboval, densely punctate above, with red or chestnut-brown over most of the luteous ground color, beneath yellowish-testaceous, remotely, coarsely and deeply punctate, each humeral angle curved forwards in an acute thorn. Head longer than wide, narrowing towards tip, the lateral lobes sinuated, a little curved at tip, with the margin reflexed, the tylus prominent, scarcely longer than the lateral lobes, marked by a callous, yellow line which continues to base of vertex, remaining surface with longitudinal lines of punctures, between which are irregular and waved yellow lines, which are broken at base; antennæ obscurely testaceous, sometimes dusky on the last two joints, basal joint very short, not more than half as long as the head before the eye, second one longest, third about two-thirds the length of the fourth, about equal to the fifth; rostrum yellowish-testaceous, reaching to the posterior coxæ, the apical joint pale piceous. Pronotum subtriangular, across the humeri a little wider than long, surface between the patches of coarse, partly confluent punctures smooth and callous, callosities smooth, bald, almost discoidal, sending off a lateral tongue; anterior margin defined by a slender yellow line, followed behind by another curved line, the lateral margins very wide, flat, callous, yellow, curvedly diagonal, denticulated almost throughout, the inner border defined by an incised line, the humeral thorns long, black or dark brown, directed diagonally outward and curved, punctate and ribbed; postero-lateral margins broadly curved, having a yellow line on the submargin; posterior

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margin truncated, triangularly produced each side of scutellum. Scutellum long, contracted and sinuated behind the middle, remotely punctate, more finely and densely so before the tip, a large bald spot at each basal angle, apex regularly rounded, the extremity with a yellow lunule. Corium more regularly punctate than the pronotum, with the sutures and costal margin yellow; membrane bronze-brown. Legs pale yellowish, coarsely punctate, the nails and articulations of the tarsi piceous. Length to end of venter 8½ to 10 mm. Width across base of wing-covers 4 to 5 mm.

More than a dozen specimens have been examined by the writer. These were collected in Cuba by Dr. John Gundlach, and in Southern Florida by several of my friends. Some specimens have a brown band on the segmental sutures of the connexivum. The tergum is rufous or brownish, and occasionally there is a yellow stripe on the middle line of the pronotum.

Hymenarcys crassa, New sp.

Ovate, broad and thick, pronotum and head forming a triangle, color pale cinnamon-brown or luteous, closely, finely and deeply punctate with dark brown. Head long and narrow, remotely punctate in lines, the lateral lobes somewhat foliaceous, longer than the tylus, acutely narrow at tip, with the lateral margins slenderly black, tylus narrow, cylindrical, very slightly thicker at base ; antennæ slender, black, the basal joint not quite reaching tip of head, second a little longer, third longest, fourth a very little shorter than the fifth, which is next to the third in length ; rostrum slender, luteous, piceous on the middle line and at tip, reaching to behind the middle coxæ. Pronotum wider than long, convex, the anterior lobe depressed, and with several bald spots and spaces behind the anterior border, lateral margins almost directly oblique, strongly reflexed, pale testaceous, carried around the

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bluntly rounded humeri, middle line of the surface pale luteous, connecting with the pale line running forward upon the tylus, basal margin almost truncated, very faintly concave, the latero-posterior margins long, depressed, bluntly curved. Scutellum long, a little convex near the base, punctate with brown, the base marked with a series of pale, bald spots, basal angles each with a diagonal incised line, lateral margins oblique, a little sinuated, the apex bluntly rounded. Corium wide, bluntly rounded on the inner part of posterior margin, with the exterior angle acutely triangular, the disk with a small, pale spot, and other smaller pale spots occupy the suture bounding the costal area, clavus narrow and short; membrane pale brown, running very slightly beyond the apex of abdomen, the veins running back in forks and angular branches which enclose some irregular areoles. Legs dull luteous, finely specked with black. Pleural pieces luteous, punctate exteriorly. Venter luteous, punctate with black on the sides, broadly smooth and bare on the middle line. A fine black dot occupies the angle of the incisure on the outer pale margin; inner part of tergal connexivum clouded with groups of fuscous punctures.

Length to tip of venter 11 to 12 mm. Humeral width 7 mm.

Four specimens, all females, were secured in Arizona by Mr. Morison.

Euschistus conspersus, New sp.

E. conspersus, New sp.—Suboval, grayish-brown on a testaceous ground, beneath pale testaceous, sprinkled with rufous on the venter. Head long, narrow, depressed on the lateral lobes, which are strongly reflexed, and formed as in *E. impictiventris* Stål, the tylus barely extending to the tip and partly enclosed by the curving lateral lobes, the punctures fine, black, deep, and moderately close together; antennæ yellow, with the apical joint

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dusky except at base, barely longer than the fourth, basal joint short, not quite reaching the apex of the head, second a little longer, but much shorter than the third, the third and fourth long, subequal in length. Rostrum reaching between the posterior coxæ, the middle line dark, and the apical joint a little piceous at tip. Pronotum transverse, closely, finely spread with deep, fuscous punctures, which become coarser towards the base and are distributed between series of transverse, callous waves and indentations of the surface; sides deeply sinuated, with the margins callous, reflexed and pale yellow, having a few indented points anteriorly; lateral angles prominent, triangularly rounded, curved upwards and with the margin broadly reflexed, the posthumeral margins broadly curved. Scutellum moderately long, finely punctate with fuscous, the apex narrow, depressed, subacutely rounded, bordered with white, the base transversely wrinkled. Hemelytra a little paler than the pronotum and rather less closely punctate, marked with some scattered pale dots and smaller black specks, the costal edge pale, especialy at base; membrane pale brown, dotted with black. Legs yellow, remotely dotted with black. Pleura with a series of small black dots, exterior to which is a single black dot, the surface remotely spread with uncolored punctures. Venter finely punctate, dotted and flecked with red and brown, many of the dots being arranged in transverse, curved series, connexivum with black points at the sutures, which above are exteriorly replaced by larger, double spots; anal segment of male a little sinuated.

Length to end of abdomen 11 to 12 mm. Width across humeri 6 to 6½ mm.

I have examined a few, mostly damaged, specimens from California, vicinity of San Francisco. It is distributed north into Washington State.

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Dendrocoris contaminatus, New sp.

Flavo-testaceous, punctate with brown, the anterior lobe of pronotum black, which color is interrupted in the middle and angularly expanded just before the humeri, the middle of disk of posterior lobe marked with two black dots. Broad suboval, the head narrow, and obliquely narrowing to the tip, blackish and roughly punctate with black, the base between the eyes and lateral lobes with several coarse wrinkles which are bounded by scratched lines, the tyles enclosed at tip by the converging lateral lobes; antennæ moderately slender, the first joint a little swollen and thicker than the others, subequal in length to the second joint and about two-thirds the length of the third, the third longest, the fourth nearly equal, a little shorter than the third, points of articulation of all the joints blackish; rostrum pale luteous, sometimes tinged with rufous, reaching to the middle of the posterior coxæ, the middle line and apex dark piceous. Pronotum two-and-a-half times wider than long, pale luteous, sometimes tinged with fuscous, marked with black as recited above, closely, in part roughly punctate with fuscous, occasionally with rufous or pale punctures, the callosities polished, curved, lateral margins gradually sinuated, pale, punctate with obsolete granules anteriorly, humeral angles moderately prominent, a little triangularly rounded, blunt, almost emarginated, the latero-posterior margin short, very moderately oblique, a little sinuated, the posterior margin straight. Scutellum longer than wide, rugosely punctate with blackish, mostly in transverse, wavy lines; back of the middle is a pale, parallel-sided, almost bald, callous stripe, which connects indistinctly with the pale apex, the base with a small pale spot in each angle, and sometimes with two or three small streaks along the middle border. Corium punctate with fuscous, and having callous, uneven intervals of the punctures, seam bounding

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the costal area interiorily callous, pale and widening posteriorly; membrane tinged with brown, a little longer than the venter, the veins very distinct, one pair near the inner border forked. Connexivum exposed, pale, the sutures marked by obscure lines, each ending in a black dot; venter unevenly sprinkled with either fuscous or red, closely, unevenly punctate, the middle line polished, remotely punctate. Pleural pieces coarsely and in part confluently punctate; embolium remotely punctate. Legs finely and unevenly punctate, pale yellow, with the tarsi piceo-rufous, and the nails piceous. Genital segment of the male blunt, emarginated each side, bounded exteriorly by a raised, callous rim, swollen on the middle and grooved there. Length 6 to 7 mm. Width across humeral angles 4 to 4½ mm.

This interesting species comes nearest to D. *humeralis* Uhler, but it differs in form of head, markings of pronotum, form of humeri and lateral margins, etc. It was collected in Arizona by Mr. Morrison, and more lately by Mr. Hubbard near Tucson, Ariz.

Corixa serrulata, New sp.

Dark brown or fuscous, form of medium width, lines of the upper side yellow. Head moderately short; ivory white, vertex very slightly convex, subacute at the middle of the reflexed occiput, at the very tip of which is a brown granule, inner corner near the eye marked with two impressed, unevenly punctate, short lines, occipital line very slightly curved; front bluntly curved, convexly raised on the middle, and this is followed below by a concave fovea, which is nearly circular and fills the entire width between the eyes; clypeus transversely brown, the flat rostral segments paler brown, margined exteriorly with white. Pronotum moderately convex, having a brown carina on the middle line; the surface unevenly punctate, feebly rastrated at intervals, and spread with minute, yellow

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pubescence, crossed by about nine yellow bands which are curved and placed closer back of the middle, these mostly bounded by fine scratched lines; posterior margin oblique and a little curved, anterior angles broadly yellow; sternal pieces dull black, the scapula, prosternal lobe, postpleura, and parapleura ivory-white. Legs mostly ivory-white, more than the apical half of palæ, middle of both sides of anterior femora, apices of joints of posterior tibiæ and tarsi, base of intermediate femora, and apex of tarsi, besides a line on tibiæ, black. Hemelytra slightly and unevely rastrate-punctate, spread with minute yellow pubescence; clavus with the six or seven basal yellow lines nearly straight, behind this are usually three forked ones, followed by slightly curved lines from thence to tip; yellow lines of the corium of medium width, slightly waved. On the membrane the lines are less parallel and more waved; embolium with a black streak at base, a large spot on the middle and a submarginal line of punctate spots which terminates apically in a long sagittal streak. Venter dull black, pubescent, bordered with white and fringed with white hairs.

Male. Length to tip of venter 6 mm. Width of pronotum 2 mm.

Only males have thus far been brought to my notice.

The palæ are curved, cultrate, with the inner base triangularly expanded. This species is marked similar to *C. praeusta* Fieber, and it inhabits the highlands of Mexico, Southern California, and Arizona.

Corixa acuminata, New sp.

Pale smoke-brown, narrow, head much longer than the pronotum in the male, produced anteriorly into an acute point, which forms the apex of a thick carina. Pronotum very short, convex, with almost obliterated bands, apparently seven in number. Palæ of the male obliquely subovate, acute at tip, with the tibia very broad, moder-

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ately short. Head broad, eyes large, nearly triangular, a little emarginated on the outer border, the fovea acute-ovate, occupying most of the front, front and vertex broad, the carinate line on the middle thick, continuous, acuminate at tip, middle of occiput triangularly produced. Pronotum very short, convex lurid brownish, with six or seven broad, yellow bands, the basal one very short. Surface minutely rastrate, polished, bluntly rounded behind. Clavus minutely rastrate, pale, lurid brown in some specimens; others are faintly marked with series of yellowish, transverse flecks, which are bent and sinuous in large part, especially upon the corium, the corium feebly rastrated before the middle, hairs of the surface long, sparse, prostrate, pale yellowish, costal area pale yellowish, slenderly margined with dark brown.

The palæ of the female broad, scythe-shaped, wider before the tip, which is a little curved, the tibiæ are narrower and much shorter than the palæ and a little curved.

Length from tip of head to end of hemielytra ♂ 5 mm., ♀ 4⅓ mm. Width of pronotum 1½ mm.

Numerous specimens of this insect were collected in Central Texas by G. W. Belfrage, and specimens sent to me from Northern Illinois by B. D. Walsh. It seems to be closely related to *C. Burmeisterii* Fieber.

Corixa Kennicottii, New sp.

Badius or fuscous, marked with luteous, long and moderately narrow; pronotum short, broadly curved on posterior margin, the middle carina percurrent and terminating in a small knob at the posterior end; six transverse pale yellow lines, the posterior one very short, most of these lines bordered with a fine incised line; sutures and margins of the hemelytral pieces pale yellow. Head prominently convex in front, whitish, triangularly a little produced behind, depressed before the occipital middle, and terminated there by a gradually tapering cervical

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ridge; two irregular lines of punctures on each side of the front; fovea of the male small, shallow, bounded by coarse punctures, bluntly oval above, extending upwards about one-eighth the length of the eyes. Pronotum moderately convex, coarsely rastrate, the transverse yellow lines very slightly curved, each bordered by a fine scratched line, the anterior margin defined by a slender carinate line, the posterior margins yellow; the pectoral pieces more or less clouded with pale brown, xyphus acute, of medium length, ivory-white, prosternal lobe usually white, broad. Clavus minutely rastrate, marked with long and wide, yellow, incomplete and forked or sagittate lines at base, but with three series of almost obliterated flecks running back towards tip, and another series of minute lines touching the outer suture, sutural lines yellow; corium obsoletely rastrate, marked with forking lines of slender yellow flecks, which form three series from behind the middle to the tip, inner subsutural line marked with a continuous series of minute flecks; costal area yellowish, almost obscured by a smoke-brown streak which tapers posteriorly, the apex broadly yellow; membrane very dark, marked with well separated, uneven flecks, which are arranged in looped lines posteriorly. Legs yellowish, the palæ ♂ ligulate, a little wider apically, the tip a little curved, but almost truncate, the upper and lower border and bristles brown, tibia much shorter than the pala, a little curved, palæ of female oblong-ovate, acute at tip, bordered with brown, and with brown bristles on all the margins. Tergum black or dusky, bordered with yellowish, venter dusky or black, with a pale border. Length to tip of membrane 8 to 8½ mm. Width of pronotum 2 to 2¼ mm.

Common in the Coastal region. It occurs also in the vicinity of Chicago. In shallow pools, heated by the sun's rays, these insects are cooked of a red color.

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PRELIMINARY NOTICE OF A RECENT SERIES OF GEOLOGICAL ACCUMULATIONS, THE McHENRY FORMATION.

By P. R. UHLER.

On various occasions within the past twenty-five years, specimens of wood, leaves of modern trees, bark, seeds and other deposited materials have been brought from the black bogs and next overlying beds of the Patapsco region for examination, identification and discussion. My investigations of these deposits, their contents and relations have brought out the following facts and inferences.

This series of marshes and beds constitutes one of the latest formations of the Modern Period. It extends over parts of the recent beaches of the Patapsco river and Chesapeake bay, and near Baltimore composes the upper part of the Fort McHenry plateau, in the marsh of which the Bald Cypress, *Taxodium distichum* Rich. and the common White Cedar, *Chamæcyparis sphæroidea* Spach. formerly grew. Stumps of these trees were numerous in the black mud which underlies the black, the drab and the yellow clays capped by the upper sands and gravels of the shores of Whetstone Point in the harbor of Baltimore, occurring also on the West Branch of the Patapsco river adjoining the lands of the United States government at Fort McHenry, and the continuation of these shores towards Winan's Cove, as well as farther back under the beds of Eutaw and Howard streets to near West street.

The formation varies greatly in thickness and where complete continues up from the black marsh, or marshy sand, deposited in the depressions of the cretaceous clays. Probably the thickest series of beds of this formation, which has recently been exposed to examination, is that where the sewer was dug beneath Eutaw street, south of West street. Omitting the 5 to 8 feet of gravel, sand and soil of the surface, the total thickness is 23 feet. The

November 19.

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series becomes gradually thinner northward, and was not observed much farther up than Cross street. The great thickness and weight of clay and sand resting upon this lower black mud have compacted it very closely, and made it in many places an indurated, although wet clay. Here and there in softer patches rest the embrowned leaves of various recent trees and shrubs, such as the Swamp Maple, the common Beach, the Scarlet Oak, the Chestnut, Alder, Willow, and the needles and round fruit of the Cypress. These latter were very little flattened out, but neither they nor any of the leaves were fossilized. They were saturated with water, were quite flexible, and were found almost exclusively in wet pockets or cracks of the black clay, sealed up sometimes with twigs and bits of bark. The section at this place has at base a stratum of black clay 5 feet, or more, in thickness, most of which overlies the roots of the Cypress tree stumps which stand erect and in undisturbed position there. One of these stumps was 7 feet in diameter and 6 feet high, others (fifteen were counted and roots of others seen) were about three feet or less in diameter, but not so high, with ragged upper ends, and more or less of the bark remaining. This stratum is quite damp throughout, flaky in large part, and decidedly wet in spots where pockets and cracks occur. Above this rests a drier stratum of lead-colored, dense clay, 6 feet in thickness, separated by a perfectly defined line from the underlying bed. This is followed above by about 5 feet of yellowish or pale clays, parted into three strata by a few inches of pale sand. These clays become more sandy above, and are separated at base by a well-defined line, but conform to the mostly level surface upon which this member rests. This third bed is almost dry throughout and is separated from the overlying, in part cross-bedded, sand by a distinct structural unconformity. The strata of the McHenry Formation are designated by

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bedding lines which seem to show that each was separated by a short interval of cessation before the next was begun to be laid down. Fine sedimentation ceased before the third bed was completed, and the deposition of coarser sands in well arranged strata gave evidence of the exercise of more powerful energies in the transportation of materials.

Other exposures of like composition, but of less thickness, occur on Patapsco neck, at Canton, on Bear creek, head of Humphrey's creek, Back river and Bodkin creek. A still larger exposure appears on the Chesapeake Bay shore, beginning about one and a half miles south of Bodkin point and extending nearly 500 feet in the direction of Gibson's island. After an interval of a few rods the black clay again appears and continues along to a distance of perhaps half a mile from the drain separating that island from the mainland. The basal bed of black clay is very thick along this line, but it becomes much thinner as we approach its southern end. At its northern end, it is fully fourteen feet thick, and rests in a remarkable basin, bounded on the north side by a belt of Upper Cretaceous brown sandstone which bends down in a steep slope beneath the level of tide. At this point the high coast bounds a deep cove, in which numerous stumps of the modern Bald Cypress stand rooted and in place. Some of these stumps belong to trees which were six to eight feet in diameter near the base, while the greater number measure but two or three feet; just as we now find them in the present Cypress Swamps of Worcester County. The stumps at this place are more changed, and differ from most of those in Baltimore, by reason of their having been soaked for a number of years in carbonaceous mud, charged with astringent solutions of alum and iron, derived from the lignite of the adjoining Cretaceous clays. This has had the effect of consolidating

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their tissues and giving to them a brown color and tough texture related to lignite. The specimens from localties in South Baltimore have not been changed in this manner, but have almost retained their color, while they have gained much in flexibility. Those, however, which have been dug out of the astringent, muddy clay of the Fort McHenry plateaux were brown and contracted like those from the bay below Bodkin Point. Through the kindness of Colonel Craighill, specimens of all the kinds of residual material and wood, dug or dredged from the mud and clay of the Fort McHenry border of the river, have been given to the Maryland Academy of Sciences, and I have thus been enabled to give them a close and comparative examination. The broad depression of surface which still exists next the cove at the foot of Howard street, has a considerable part of the surface uncovered, and in this noxious marsh may still be found the stumps of Cypress and Willow which grew in that region less than one hundred years ago.

These remnants of a formerly more extended series of marsh deposits along the borders of the estuaries and bayed out coasts of the Western Shore of Chesapeake Bay are mostly restricted to troughs and shallow basins of lowland drainage. These areas were lower than the adjacent land, and were made so by the strong tides backing inward the water of the branches, causing overflows and eddies which in time of storms eroded the banks of the drains and carried out the disintegrated materials into the estuary of the river. This work of the tides has been almost brought to a close by the filling up of the Patapsco river, although it still keeps on along the shores of Chesapeake Bay, if not along the broad mouths of large rivers, such as the Patuxent and Potomac.

We are now beginning to find that some of the time estimates of the Quaternary period have been too long,

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and that it has not taken millions of years to complete the structures now in view. Still further, if we accept the time it has taken to fill the basin of the West Branch of the Patapsco River ten feet, as well as the estuaries of the broad creeks which formerly poured large volumes of water into the Patuxent and Potomac rivers, we shall find that the past fifty years have sufficed to fill up these water courses. Vast changes in the surfaces of our land and water have taken place within that time. The drying up of springs along the courses of our creeks and rivers, taken alone, shows a loss of fifty *per cent.* in the volume of water within the last forty years. The filling up along the shores of our Spring Gardens, and at the mouth of Gwynn's Falls, and on the Patapsco river during the last thirty-five years has added hundreds of acres to the lands of property owners there. Were the bed of the West Branch of the Patapsco river, above the Light street bridge, raised twelve feet above its present level, a section of mud, clay and sand would be exposed, very similar to that which we see in the formation at the foot of South Eutaw street. Strong floods in the streams backed against high tides have, in recent times, cut away and trimmed off the projecting ends and sides of many banks of clay which stood in their way along our rivers, near Baltimore, and have thus eroded wide areas for the entrance of the tides. Later, however, these spots have generally been covered with sediment washed down from the higher lands, aided by gentle overflows of the tides, until now these tracts lie above the reach of the highest overflows. Examples of this kind may be seen at the mouth of Gwynn's Falls, Herring Run, Gorsuch's Creek, head of Back river, and Patapsco river, near the crossing of the Annapolis railroad, besides many other places on the tributaries of the Chesapeake, north of that river.

The strata of this group of deposits have thus far

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yielded no mineralized fossils. Beside the modern leaves, etc., of trees, impressions of two forms of Unios, entirely without the shell, have been dug from the black clay. From the form and impression left by the shell, I am led to believe that they belong to the common living species which have frequently been taken from the pools of dirty water in the adjoining black bogs, and which may still be found in the mud of the brick ponds in this vicinity, as well as in Winan's Cove. These two species are *Anodon fluviatilis* Lea, and *Unio complanatus* Say. The above record is most suggestive, because of the very modern period of construction of this comparatively thick series of sedimentary beds. Of course, it is a fact of actual knowledge that the volume of water carried by the streams entering our Maryland Coastal Plain was much greater and consequently far stronger a few years ago than it is at the present time. It is not therefore necessary to assume a general depression of the tidewater region to account for the presence of this formation.

The accumulations of sediment over the low levels near the mouths of small creeks, such as Gwynn's Falls, Herring Run, Stemmer's Run, etc., have filled them up more than five feet within the last thirty years. If we take this fact in connection with the broader relations of degradation and deposition in this region, we shall see that the accumulation has exceeded the seaward transportation by a large surplus. Evidences of a general depression of the Coastal Plain immediately preceding the formation of these marshes seem to be wanting. The erosion and degradation which laid bare the areas to be occupied by the marshes was not of uniform intensity, and accordingly their base lines are not all on the same level. So we see evidences of local forces cutting deeper in some places than in others, and we fail to find a general distribution of this particular kind of sediment over the low levels of this region.

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AIDS TO A RECOGNITION OF SOME NORTH AMERICAN GENERA AND SPECIES OF THE OLD FAMILY FULGORIDÆ.

By P. R. UHLER.

The genus *Scolops* Germar forms one of the characteristic groups of the smaller *Fulgorids* which belong to temperate North America. Like other genera of the same family, some if not all of the species have individuals with short, moderately long, or fully developed hemelytra. These stages of development of the adult insects carry with them modifications of the hemelytral areas and the veins, and determine to a certain degree the thickness of the integument, which when fully developed becomes thin and membranous posteriorly. The same conditions prevail here as in the genera *Phylloseclis*, *Naso*, *Bruchomorpha*, etc. That is, individuals of the short-winged form are most commonly met with, at least in the Atlantic States, but in spots especially favorable for their development, they derive vigor enough to become completed. Experiments are needed here to determine the meaning of these phases of personality, their origin, their duration, and their broader connections with the cycle of other forms amid which they emanate and where they prosecute their struggle for maintenancy. Most of them live in places where the ground is damp, on grasses and low herbage which from density of growth afford them means of concealment and protection. Their color, when mature, is some shade of straw yellow, usually darkened by weathering and contact with damp stainings on vegetation and soils. In the dryer air of the uplands, and especially of the Rocky mountains, these insects mature to a grayish tint and become powdered with a whitish bloom. Occasionally solutions of iron rust stain them a dusky fuscous tint.

May 25.

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Scolops, Schaum. Ersch. Cyclop.

Table of species.

I. Cross-veins of hemelytra numerous.
Frontal process slender, acute, ... 1. S. sulcipes Say.

II. Cross-veins few, near apex.
Process long, less acute, . 2. S. spurcus, New sp.
Process long, not acute, . 3. S. perdix, New sp.
Process long, thicker, acute, ... 4. S. hesperius, Uhler.
Process long, subacute, . 5. S. pallidus, New sp.
Process short, very slender, ... 6. S. angustatus, Uhler.
Process of medium thickness, not acute, . . . 7. S. desiccatus, New sp.
Process thick, constricted at tip, ... 8. S. grossus, Uhler.

1. Scolops sulcipes. *Fulgora sulcipes* Say. Journ. Acad. Nat. Sci., Phila., iv, p. 335.

This species may be recognized by the numerous areoles behind the middle of the corium, and the black spots are placed along the inner margins of the veins, instead of upon them. There is, however, a series on the costal marginal vein.

This insect has an extended geographical distribution, ranging from the vicinity of Winnipeg to Minnesota and west to the State of Washington. West of the Mississippi river it occurs in all the States down to Arizona, and from thence through Texas and the Gulf region to the Atlantic lowlands north into Maine. Sheltered spots in the Rocky mountains and the lower mountains of the Appalachian system are inhabited by it.

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2. S. *spurcus*, New sp.

Grayish straw color, marked with black, larger than either of the other species, and with coarser veins than S. *sulcipes;* tinged with greenish when fresh. Frontal process long, narrow, almost parallel-sided, truncated at tip, vertex deeply excavated, the central knob large, highly polished, face pale, flecked with brown, space between the outer carina and the carinate margin narrower than in S. *sulcipes*, and not abruptly contracted above, sulci remotely punctate, clypens stained with brown, gradually widening below, rostrum reaching to the posterior coxae. Pronotum short, lunate, with the lateral margins gently curved, and the latero-posterior margin widely sinuated, the callosities carrying three dark, or black, grains, central tablet longer than wide, with the two central indented points black, the middle carina thick and piceous, mesonotum almost smooth, wider than long, pale orange yellow, acute at tip, sinuated each side, the central tablet large, carinate on the middle and lateral margins. Legs long, particularly the anterior pair, the femora and anterior tibiae carinated on the middle line, scabrous and pointed with brown, the anterior and middle tibiae faintly, broadly brown at base and tip, posterior tibiae pale, set with eight blackish spines on the carinate edge, and with a crown of thick spines at tip, apex of tarsi and nails piceous. Hemelytra pale gray, with a fuscous arc near tip, veins coarse, whitish, interrupted with black, long, nearly straight, without cross veins before the apex, inner vein acutely forked at the middle, the middle vein twice forked, tip with a transverse series of six small, not uniform areoles; wings smoke blackish, with three forked and one cross vein, posterior border with one small, triangular areole. Tergum mostly smoke brown. Mesosternal plates white, or greenish, dusky on

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the middle, a little sinuated behind, metasternum narrow, whitish, blackish exteriorly, triangularly emarginated each side and on the middle of the posterior margin, middle line incised. Venter clouded with gray and fuscous. Length from eye to apex of venter 5½–6 millims.; to tip of hemelytra 6½–7 mm. Length of cephalic process 2 mm.

Inhabits neighborhood of St. Louis, Mo. Riley county, Ks. Prof. Popenoe, and coastal plain of Maryland, in June and July. Not common.

3. S. *hesperins*, Uhler. Hayden, Bullet. U. S. Geol. Surv. of 1873. Washington, 1878, p. 83.

More robust than S. *sulcipes*, with a thicker and relatively shorter cephalic process, which is constricted on the immediate tip. The hemelytra are long ovale, not much longer than the body, with the veins thick, pale, and dotted with brown, the tapering, but rounded, tip is occupied by six quadrangular and triangular cells. The anterior femora compressed, sharply carinate, but as wide as in S. sulcipes.

In one specimen from Texas the cephalic process is as long as the clavus, its upper surface is widely grooved throughout, with only a trace of a carina at base, the middle carina of the pronotum is thick and sharply defined, but obsolete on the mesonotum, and the apical cells of the pronotum are stained brown.

None of my specimens appears to be maturely colored, and it is possible that all of them may have been bleached by exposure to sunlight.

4. S. *pallidus*, New sp.

A coarse and heavy-looking insect with long, stout legs, oblong figure, tapering whitish hemelytra more or less streaked with fuscous and with a cloud or two of fuscous

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near the tip; rostrum stout, reaching far behind the posterior coxae. Cephalic protuberance long and stout, above grooved throughout, pale, flecked with brown on the carinate lines and margins. Pronotum contracted at the base of the head, the tablet deeply grooved and prominently carinated, short, deeply sinuate behind, the latero-posterior margin feebly sinuated, and the sides narrow; mesonotum almost flat, feebly carinated. Hemelytra but little longer than the abdomen, almost white, variably streaked with fuscous, the veins spotted with fuscous, the costal vein sometimes made brown by the close dots, one forked vein running back from the middle enclosing a long, narrow area, which is sometimes closed posteriorly, before the apex is a transverse series of about four cross-veins, and on the apex five or six small cells of different shapes; wings dusky. Beneath straw color, the meso-sternal segment whitish, deeply emarginated on the posterior middle, the metasternum longer, still more deeply sinuated, and incised on the middle line. Anterior femora flattened, sharply carinated, the legs dotted and spotted with brown, tibiae pale, twice banded with pale brown, the posterior pair with seven piceous thick spines, nails piceous.

Length from eye to tip of abdomen 4–4½ millims.; to tip of hemelytra 5 mm. Length of cephalic process 2–2¼ mm.

Specimens from Los Angeles, Cal., were kindly presented to me by Mr. D. W. Coquillett.

5. S. *perdix*, New sp.

Pale straw yellow, or gray above, cephalic process moderately long, slender, tapering, rounded at tip, deeply sulcated, with a very convex knob on the middle of the vertex, the front with rows of minute brownish dots. Pronotum short, the central tablet with two very deep

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sunken black pits, the posterior side and the margins each side deeply sinuated; the mesonotal tablet large, distinctly carinated, with a black dot on each side posteriorly. Hemelytra narrow, with very few veins, two forks of unequal length running back to the tip, veins obsoletely and very sparingly flecked with brown, the apex narrow, having four or five small apical areolets mostly caused by forking of the veins, costal border often broadly white, very moderately curved. Legs narrow, of medium length, but little marked with brown, or obsoletely clouded. Meso- and metasternum whitish, the latter deeply emarginate. Base of venter also whitish. Anterior femora flattened, posterior tibiae with five stout, piceous spines. Rostrum reaching almost to the apex of the venter, as usual black at tip.

Length from eyes to tip of abdomen 4–4½ millims.; to apex of hemelytra 4½–5 mm. Width of pronotum 2¼ mm. Length of process 1¾ mm. Inhabits Arizona, Colorado, New York and Massachusetts.

Most of the specimens that I have seen were dull straw color, with only faint markings on the hemelytra. The fully developed specimens have the hemelytra about one-fourth longer than the abdomen, and their color a dull pale smoke brown, broadly bordered with white.

6. S. *angustatus*, Uhler. Hayden, Bullet. U. S. Geol. Surv. of 1873, p. 84.

This species is closely related to the preceding, but has a very short and slender cephalic process, the head is closely set on the pronotum, the stout rostrum extends to the posterior coxae, the legs are distinctly irrorated with dark brown, and the mesopleura have a dark stripe on the sides.

This species has been taken in Dakota, Nebraska, Minnesota, Connecticut, Massachusetts, Maryland, and

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the highlands of North Carolina and Georgia. It is very variable in markings.

7. S. *desiccatus*, New sp.

Dull pale smoky whitish, of nearly the same form as S. *sulcipes*, but with the cephalic process a little thicker and nearly parallel-sided, not tapering towards the tip, and the veins dotted with pale fuscous. Front minutely flecked with brown, which becomes denser and more conspicuous on the clypeus; rostrum reaching upon the posterior coxae. Pronotum wide and short, the lateral margins oblique, very gently curved, broadly whitish yellow, the posterior margin deeply sinuated, having two large impressed points on the middle of the shield, and the anterior margin of this shield bilobate; mesonotum pale orange, almost flat, a little shaded with brown, destitute of a carinate line on the middle, and with an indented point each side of the pale apex. Hemelytra soiled with pale brown, the veins few, very prominent, pale interrupted with brown, the spots more conspicuous on the costa, exterior ulnar twice forked, the inner ulnar forked, all of these divarications bounding long, narrow areas, three rows of slender cross-veins before the apex, the apical series has four small areoles, those of the middle quadrangular. Wings a little dusky. Underside pale straw yellow, irregularly spotted and marked with dull brown; metasternum deeply excavated and acutely margined each side. Legs moderate, much darkened with brownish clouds and specks.

Length to tip of hemelytra 6–6½ millims., to end of abdomen 5–5½ mm. Width of pronotum 2 mm. Length of cephalic process 1¾ mm.

Only two specimens have come to my notice. They were collected in central Texas by Mr. G. W. Belfrage.

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8. S. *grossus*, Uhler. Hayden, Bullet. U. S. Geol. Surv. of 1873, p. 84.

Cephalic process very stout, form robust, color pale, veins very coarse, dotted with fuscous, two ulnar veins narrowly forked, rostrum very long.

Two specimens were secured for me by Mr. G. W. Belfrage, near Waco, Texas.

9. S. *pungens* (*Flata*), Germar. Thon. Entom. Archiv., v. ii, p. 47; No. 11.

This species seems to have become lost to modern hemipterists. It is described in a very rare book, of which I have met with only one copy in thirty years. A translation of the Latin description is here included for the benefit of students in this country.

"Half the size of *Dictyophara pannonica* Creuz., the head small, of a lurid color, drawn out into a slender, upturned stylus a little longer than half the length of the body, with the apex truncated. Thorax lurid, tricarinate, marked with two fuscous points. Underside of body and the legs lurid yellowish. Hemelytra a little longer than the body, lurid, with white and black points, the apical margin variegated with fuscous. Wings diaphanous. Posterior tibiae having numerous spines."

"Inhabits North America, Kentucky."

The small size of this insect, its pattern of marking, taken with the absence of ornamentation on the head, legs, etc., exclude this species from agreement with either of the foregoing.

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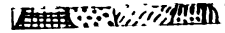

CALIFORNIA.
NEGATIVE.

FROM POONAH.
POSITIVE.

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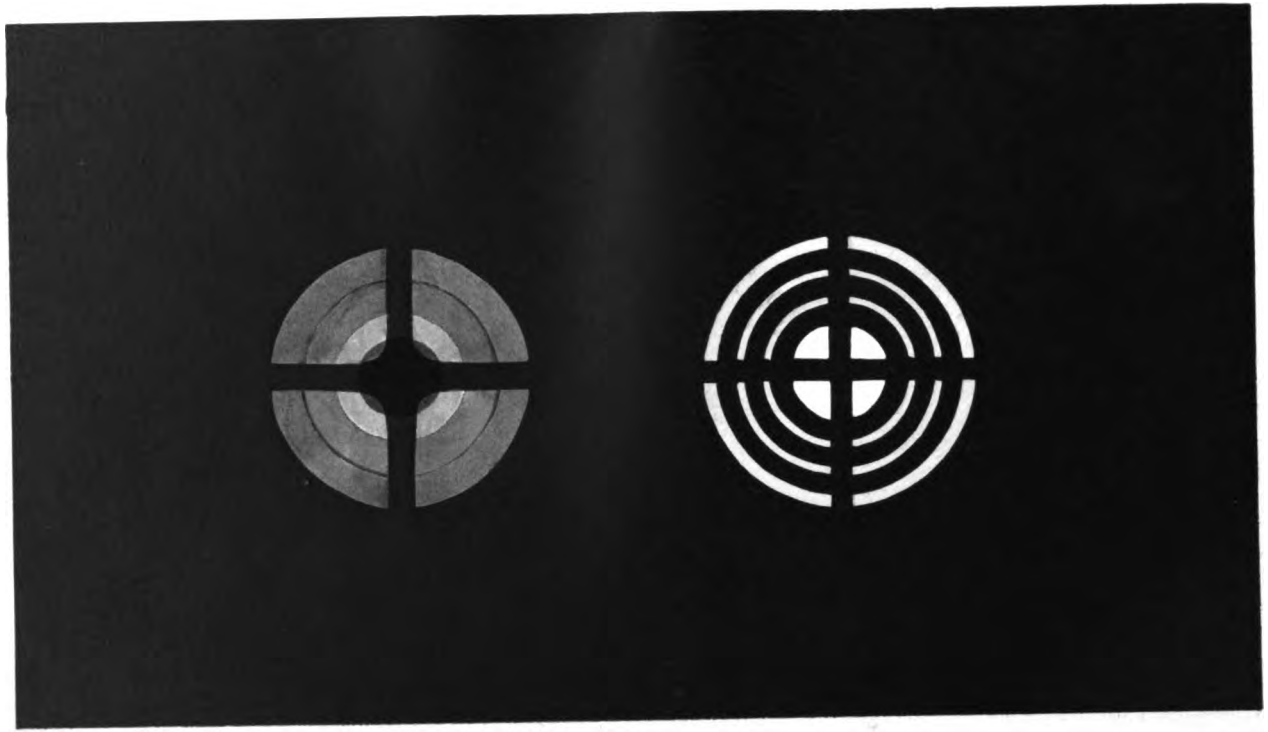

APOPHYLLITE.
NEW ALMADEN QUICK SILVER MINE,
CALIFORNIA.
NEGATIVE.

APOPHYLLITE.
FROM POONAH.
POSITIVE.

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PHOTO. BY QUARTLEY. ENGR. BY DEUTSCH L. & P. CO.

CINDER COVE (*Left*). CINDER DAM (*Foreground*). FURNACE CREEK (*Right and beyond furnace*).

AT LOW WATER, LOOKING NORTHWARD.

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